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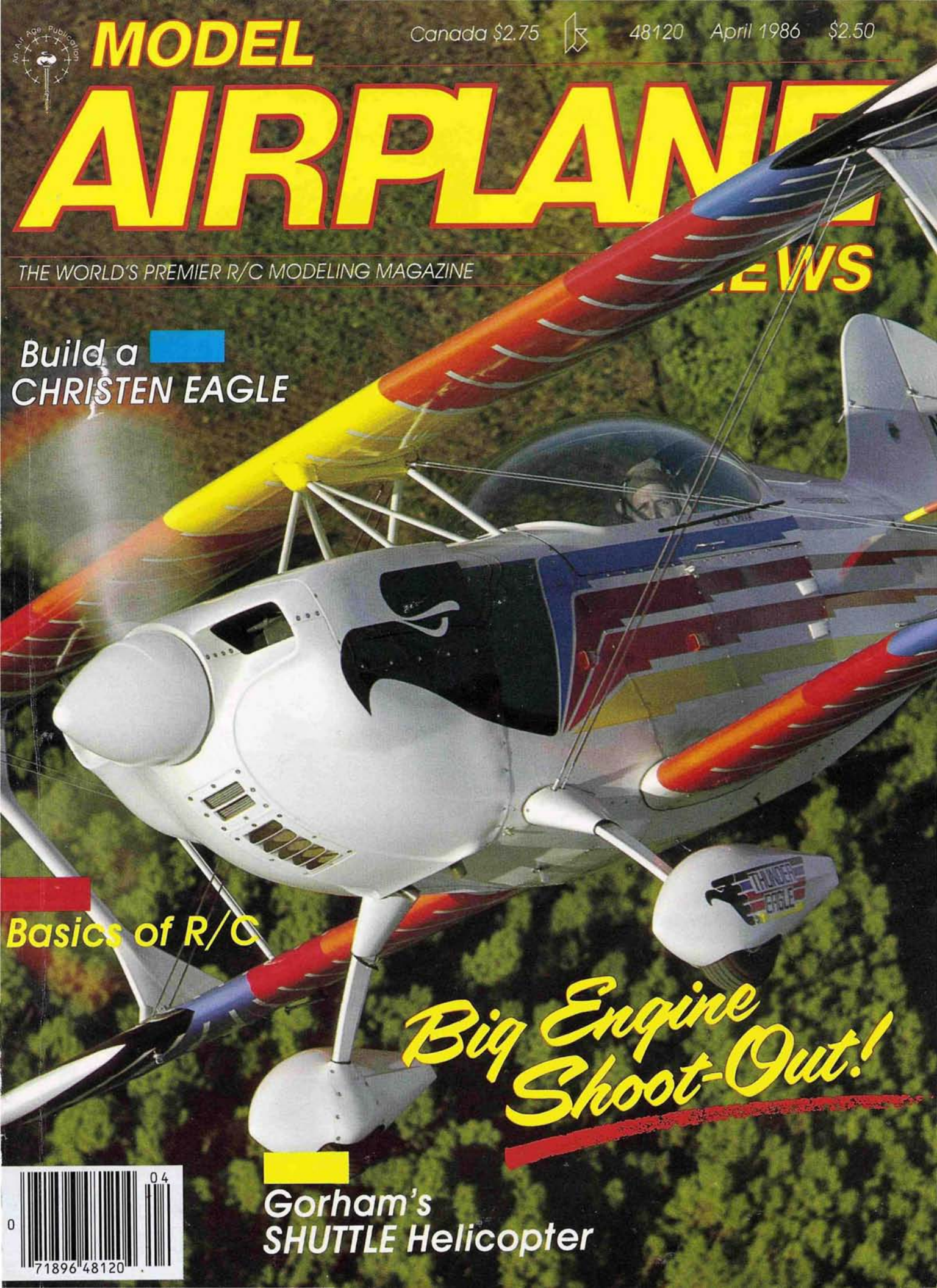
MODEL AIRPLANE NEWS

THE WORLD'S PREMIER R/C MODELING MAGAZINE



Build a CHRISTEN EAGLE

Basics of R/C

Big Engine Shoot-Out!

Gorham's SHUTTLE Helicopter

0 04 71896 48120

APRIL 1986 VOLUME 112 NUMBER 4

MODEL AIRPLANE NEWS

FEATURES

ON THE COVER: The Christen Eagle is a dramatic airplane, caught in an absolutely flawless photograph by world-famous photographer and author Budd Davisson, who also gives you a "pilot's eye view" of this bird in his article "Eagle Territory" commencing on page 20. Corresponding with the great cover photo is a Field & Bench Review of Hobby Shack's new, big E-Z Christen Eagle by ace author Chris Chianelli, which starts on page 88.

CONSTRUCTION

COLUMNS

COLUMNS

DEPARTMENTS

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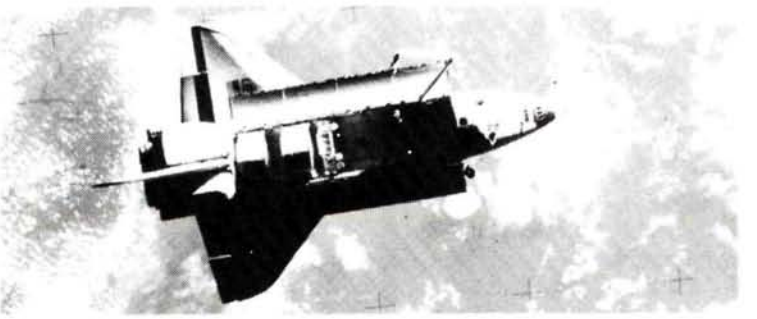
Editorial

by DAN SANTICH

WE ALL FEEL A great sense of loss about the tragic event of January 28, 1986, when the Challenger Space Shuttle exploded shortly after lift-off. We live in a time of high-tech, high-stakes space exploration where the margin between error and catastrophe can be measured in micro-seconds. Although there has probably always been an awareness of the risks, repetitive success tends to bring monotony, at least for the uninformed observers. As the Shuttle disintegrated before our eyes, the stark reality of it hit us like a sledge hammer.

We grasp for a reason, a resolve to at least calm our anxiety and emotions. There is none, and probably no one will ever be fully able to explain it.

Omni Magazine, in their January '86 issue, featured an article entitled "Last Flights—Space," by James and Alcestis Oberg in which the most prevalent question among school children, "What's it like to die in space?" was responded to. The answers were gruesomely stark. Had I been offered the choice of questions, I would have asked, "Why die in space?" Whatever the answer, the follow-up question would have to be, "Then why do it?" This is a question that has probably been asked of every effort that tries to go beyond man's conventional grasp.



The first person to give his life for the sake of flight science was Icarus in Ovid's legend of Icarus and Daedalus. In their escape from the wrath of Minos, King of Crete, the pair started across the Aegean Sea on wings of feathers secured with wax. Icarus, in his excitement to go higher, felt the warmth of the sun, which in turn melted the wax holding his feathers and he fell into the sea. Daedalus, observing this tragedy, learned from it and completed his voyage successfully.

Daedalus learned from Icarus and we will learn from the Shuttle Challenger, and continue our voyage into the unknown. Our thirst for knowledge will never stop and the crew of the Challenger wouldn't want it to.

THIS MONTH. What an issue! We have more "goodies" crammed into this one than ever before. The Christen Eagle that graces this month's cover is now available in an absolutely beautiful E-Z model from Hobby Shack. Believe me, you won't be able to turn this one down. John Clarke came up with a great sailplane design called "Firehawk" that is featured in a construction article. For helicopter fans, the Gorham Shuttle is a true breakthrough and Grady Howard says so. The Byron stable of fine scale aircraft has been enhanced with the Zero, a kit that spells a "10" in Art Schroeder's book, and for the road runners, we have a review of the MRC Porsche that is sure to get your blood pumping with excitement.

Modeling is a wonderful composition of talent, technology, and the sharing of ideas and experiences. We dedicate this issue to the crew of Challenger who were also so giving. DBS

AIRWAVES

Letter to Budd Davisson

This is not to comment on armament of the P-38, nor on the sound of invisible turbo-superchargers. My purpose is to add to your reference to the performance of the aircraft "in the hands of guys like Dick Bong and Tommy McGuire." I was a pilot in the fighter group with McGuire, and saw him do unbelievable things. Fighter planes returning from a mission usually made a straight-in pass at the landing strip, pulled a quick peel-off and 360° turn, lowering the gear and flaps in the turn, and dropped onto the runway in a rapid, continuous maneuver. (Motivation for this was the possibility of enemy planes in the area.) McGuire seemed to "wear" his P-38, and sometimes performed a variation of this tactic. He made the straight-in pass, at high speed on "the deck," but instead of peeling off, he executed a nearly vertical loop, lowering gear and flaps while doing so, and concluded by rolling down the runway as if nothing out of the ordinary had happened. You don't believe it? I don't either, but am stuck with the fact that I saw it. (Budd, if you get another chance at the P-38, don't miss a try at this.)

Another thing, you called the P-38 a "gentleman's airplane." You hit it—the gentleman was Dick Bong. He visited our outfit to tell us about the upcoming P-80, which was to replace the P-38 in those squadrons then so-equipped. He was a modest, friendly, wonderful human being. I am glad to have witnessed his 40th victory, on December 17, 1944.

I enjoyed the article and your experience immensely, and want to compliment you on your ability to "make these moments live." I actually broke into perspiration while reading your account of flying the P-51—too bad you didn't witness my first flight in a P-39.

Thank you.

JOE SPERLING
Eugene, Oregon

Alan King Design

In the early 1950s, a young Australian named Alan King won the then-popular international Wakefield event. *Model Airplane News* featured him on the cover and offered an article about his winning design. At the time, I was unsettled and travelling around, but I vowed that someday I'd like to build King's model.

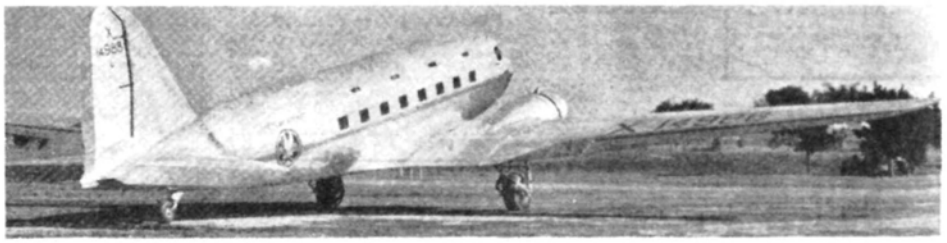
Thirty years passed, but I wrote to *M.A.N.* several months ago and asked about the issue involved. One of your staff researched this for me and though she couldn't provide a reprint, she did photocopy the article for me, a service I greatly appreciated. On the basis of the photocopy, I was able to build the model, a photo of which is enclosed. I have to say that I've not been able to duplicate King's performance, but the model is a very good flyer. More importantly, it has rekindled some of my modeling enthusiasm and confirmed my feeling that *M.A.N.* is a very fine subscription in my monthly reading.

EARL F. PATRIC
Kingston, Rhode Island

We welcome your comments, opinions, and suggestions. Letters should be addressed to "Airwaves," **Model Airplane News**, 632 Danbury Rd., Wilton, CT 06897. Letters may be edited for clarity and length.

FIFTY YEARS AGO...

by DAN SANTICH



Introduced as the Douglas DST 1936 Transport, this was an airplane that would bring success to commercial aviation.

APRIL 1936 was a bit of a "sleeper" in the realm of aviation history. All sorts of things were going on behind closed doors, and the works of metal that eventually emerged from those doors set the stage for a mark in history that is second to none.

Commercial aviation was in a quagmire over the increased operating costs of transporting passengers in low-volume, single-engine airplanes. The larger, multi-engine seaplanes were holding their own in the overseas travel business, but there was a definite lack of money to fund the development of commuter, multi-engined airplanes. In addition, ground transportation, such as train or bus, was an accepted method of travel by the public. Travel by air was still a fantasy. Many aviation companies were engaged in the development of airplanes to fill this need, one of which was Douglas. Located at Clover Field in Santa Monica, California, the Douglas Aircraft Company rolled out an airplane that set the standard by which all other commercial airplanes would be judged; the Douglas DST 1936 Transport, later designated as the DC-3. "The Dakota," "Gooney Bird," and "Puff," were just some of the affectionate names attached to this airplane, which, after 50 years, is still in commercial use. The DC-3 was the single most important contribution to the success of commercial aviation.

Modeling enthusiasts were experiencing a new era in their own world. The practicality and availability of gasoline engines for their models were a real challenge to their creativity, and new designs were cropping up all over the world to take advantage of this breakthrough. *M.A.N.* sponsored an organization known as The International Gas Model Airplane Association and a contest was scheduled for May 9, 1936, at Hadley Field, New Jersey, under the direction of Nathan Polk. The results of this contest, which will be given next month, set a direction for the hobby that changed the course of events forever, and *Model Airplane News* was there to tell you about it, 50 years ago this month.■

Leo Weiss, Cambridge, MA, a Nats winner in early gas-powered events.

Walter Rauch from Milwaukee, WI, with his early gas job.

Bob File, Columbus, OH, with meticulously built original design.

Experimental Northrop Attack plane was the forerunner of new Army attack aircraft.

For the newcomer to R/C, some things you should learn to help you have success—and fun—in this hobby!

Basics of Radio Control

by RANDY RANDOLPH

THE SPORT of flying radio-controlled model airplanes is one of the very best ways to relieve the tension of daily living, and when you actually build the model, the sport becomes a powerful weapon against boredom and monotony as well. In this column I'll make a sincere effort to acquaint those of you who are new to the sport with the things that make building R/C aircraft a pleasurable and relaxing part of the whole picture.

I'll cover all aspects of building sport-type airplanes, from initial tool and material selection to the final installation of radio equipment. All techniques will apply to scratch-building as well as kit building, so there will be value for the newcomer as he progresses through the building stages. Although aerodynamics are beyond the scope of these pages, I'll include simple rule-of-thumb type calculations when applicable. This is not intended to be a build-along effort, but, like a basic computer program, it can be read, understood, then placed in memory for later use.

Building the most complicated large-scale model is a combination of many small tasks—some as simple as cutting a piece of wood to the proper length—and requires the same amount of manual dexterity as using a pencil. But, as with a pencil, the more a modeling knife is used, the better a friend it becomes.

A big part of every column will be the answers to the specific questions about basic construction and assembly *you* ask—and please ask! I'll answer as many as space allows and I'll try to pick those of the most general interest.

Aileron	A movable surface at the trailing edge of a wing that controls the aircraft around the roll axis.
Airfoil	The cross-sectional view of a wing taken at right angles to the wingspan and perpendicular to the plane of the wing. The rib section.
Angle of Attack	The vertical angle at which the plane of the wing meets the air while in flight. Controlled by the elevator.
Angle of Incidence	The fixed vertical angle the plane of the wing forms with the horizontal centerline of the fuselage.
Aspect Ratio	The ratio of the wingspan to the wing chord (width). The number of times the width can be divided into the span.
Balance Point	The point on the wing or fuselage where the airplane is in balance. Don't confuse this with Center of Gravity.
Bellcrank	A lever with its fulcrum at the apex of the angle formed by its two arms. Allows pushrod movement to change direction.
Bulkhead	A former made from balsa or plywood that establishes the cross-section of a fuselage at a specific location.
Camber	The mean distance between the top and bottom of an airfoil from the leading to the trailing edge.
Center of Gravity	Usually abbreviated CG. The center of mass of an airplane.
Center of Pressure	An imaginary point on the top surface of a wing where the lift can be considered to center at a given time.
Clevis	A U-shaped yoke on the end of a pushrod which connects it to a movable surface via a control horn.
Dihedral	The upward slant of a wing panel from the center to the tips.
Down Thrust	Tilting the engine and propeller downward in relation to the centerline of the fuselage.

Elevator The hinged surface on the horizontal tail that controls the fore and aft trim of an airplane.

Fillet A fairing or smoothing of one surface into another for the purpose of reducing air resistance (drag).

Fin The forward or fixed part of the vertical tail.

Firewall The bulkhead, usually of plywood, that is immediately behind the engine and to which the engine is attached.

Fuselage The body of an airplane.

Jig A fixture which holds two or more parts in alignment during assembly.

Leading Edge The front edge of a wing or tail.

Longeron The main fore and aft members of a fuselage.

Nyrod A system of flexible pushrods in which one moves freely inside the other which is permanently attached to the structure of the airplane.

Pitch The calculated distance in inches a propeller will move forward in one revolution.

Planform The outline of a wing or tail when viewed from above.

Rib The cross-sectional member of a wing which maintains the shape of the airfoil.

Servo A radio-actuated, motor-driven device which imparts movement to a control surface through a system of pushrods or bellcranks.

Spars The span-wise load-bearing members of a wing or tail to which ribs are attached.

Stability The ability of an airplane to remain in level flight and return to level flight if disturbed.

Stabilizer The fixed part of the horizontal tail.

Stall The complete loss of lift caused by operating a wing at too high an angle of attack.

Sweepback The angling back of the leading edge of a wing or tail from the center to the tips.

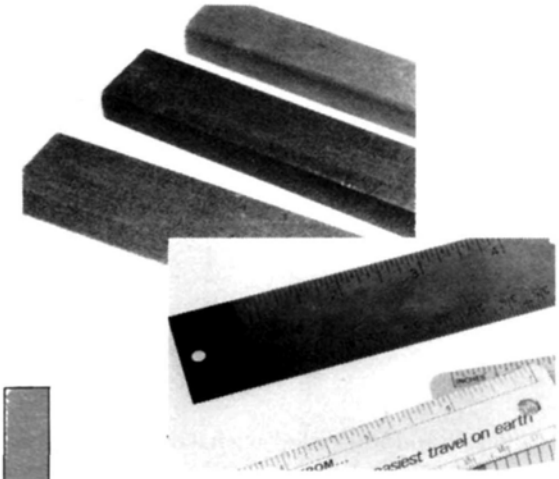
Template A pattern made from card stock or metal that is used to duplicate parts.

Torque Rod A device that transmits movement along a longitudinal axis by a twisting motion.

Trailing Edge The rear edge of a wing or tail.

Wash-in The twist imparted to a wing when the leading edge is at a *higher* angle of attack at the tips than at the center.

Wash-out The twist imparted to a wing when the leading edge is at a *lower* angle of attack at the tips than at the center.



Since even the longest trip starts with a single step, and "basic" is the language spoken here, the first step is a list of the words with their definitions that form the vernacular of modeling.

This list is not complete and more words and phrases will be added from time to time.

Continuing with our basic approach, the photos show the minimum tools necessary to the modeler. In the first photo the larger handle holds a blade made by breaking a single-edge razor in half horizontally, the other blade is the standard No. 11 available in all hobby shops. Pins should be steel and not ball-point.

The sanding blocks in the second photo are made by wrapping various grades of sandpaper around 1x2s which are about a foot long. Sanding blocks can be used to carve as well as smooth.

Sharp pencils, straightedges, and right triangles form the remainder of the basic kit. The use of these tools and others will be discussed as we progress into the construction and assembly phases of building.

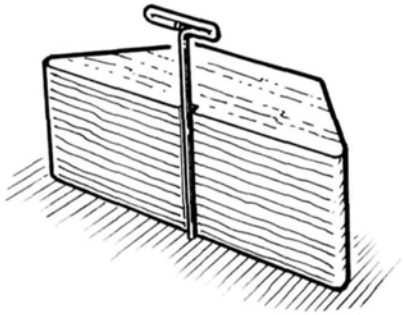
Next month, balsa, the basic material.

Randy Randolph, c/o *Model Airplane News,* 632 Danbury Rd., Wilton, CT 06897. ■

HINTS & KINKS

by JIM NEWMAN

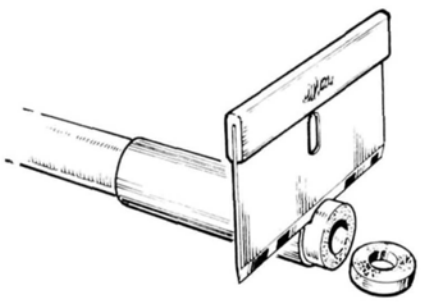
Model Airplane News will give a free one-year subscription (or one-year renewal if you already subscribe) for each idea used in "Hints & Kinks." Send rough sketch to Jim Newman, c/o **Model Airplane News,** 632 Danbury Rd., Wilton, CT 06897. BE SURE YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SKETCH, PHOTO, AND NOTE YOU SUBMIT. Because of the number of ideas we receive, we cannot acknowledge each one, nor can we return unused material.



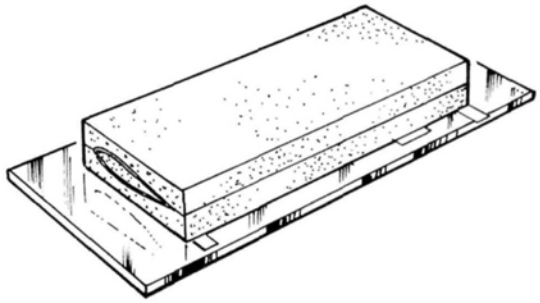
"Plumb and Square Jig" is what the originator of this little device calls it. If you can cut it on your modelers table saw so that all sides are squared up, then run it across the blade to make a small slot; it will aid in placing pins "plumb and square," by setting the pins in the slot before pushing them into your building board.

George Kanakos, Willimantic, Connecticut

The bottoms of 2-liter soft drink bottles have proven to be ready sources of radial cowlings, but removing them has been a chore. The adhesive holding the bottom to the transparent part seems to be of the hot-melt variety, so the application of gentle heat has worked well in softening the glue, allowing the bottoms to be removed fairly easily. *Gene Chase, Oshkosh, Wisconsin*

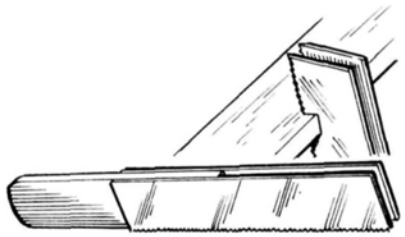


It is sometimes difficult to slice thin rings of surgical rubber fuel line, useful as a source of grommets. By inserting the rubber tubing into a piece of well-fitting metal tube and using a razor blade lubricated with liquid detergent soap, it is possible to slice off even wafer-thin discs of rubber. *Tom Ekstrand, Hudiksvall, Sweden*



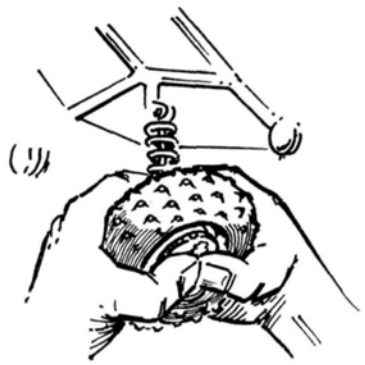
Need a really flat surface on which to shim and jig those foam wing "nests" while the sheeting is curing? This modeler robbed his bookcase of its 3/16-inch glass. The reflective surface allows the builder to easily spot where a little shimming is required and spilt epoxy is quickly removed with a swipe of a stiff razor blade. The bathroom mirror would be a good alternative.

Kevin DeShazer, Brigham City, Utah



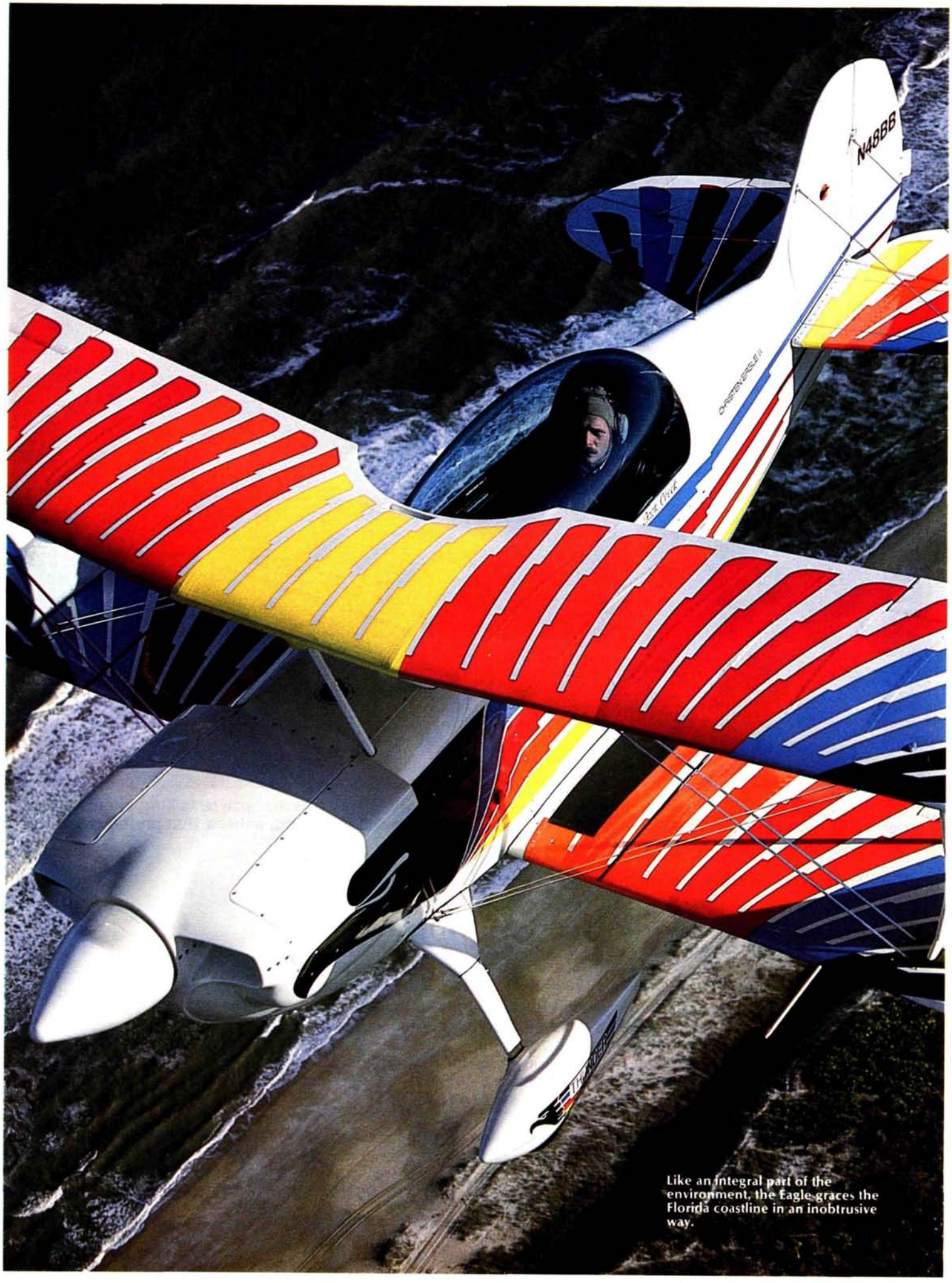
It is worthwhile spending a few minutes making an assortment of these slotting saws. The plastic center piece gives the appropriate spacing to the X-Acto saws which are glued with cyanoacrylate to each side of the plastic. In no time at all you can cut slots for ribs and spars as shown in the sketch.

Al Sievers, Oregon City, Oregon



Removing the rear wheels of dune buggies—like the Tamiya Rough Rider, for instance—can be a little tough on the thumbs. This modeler places a coin—a quarter does nicely—on top of the axle, then applies his thumbs to that, after which the wheel pops off with no pain!

Ronnie Tang, Vancouver, B.C., Canada



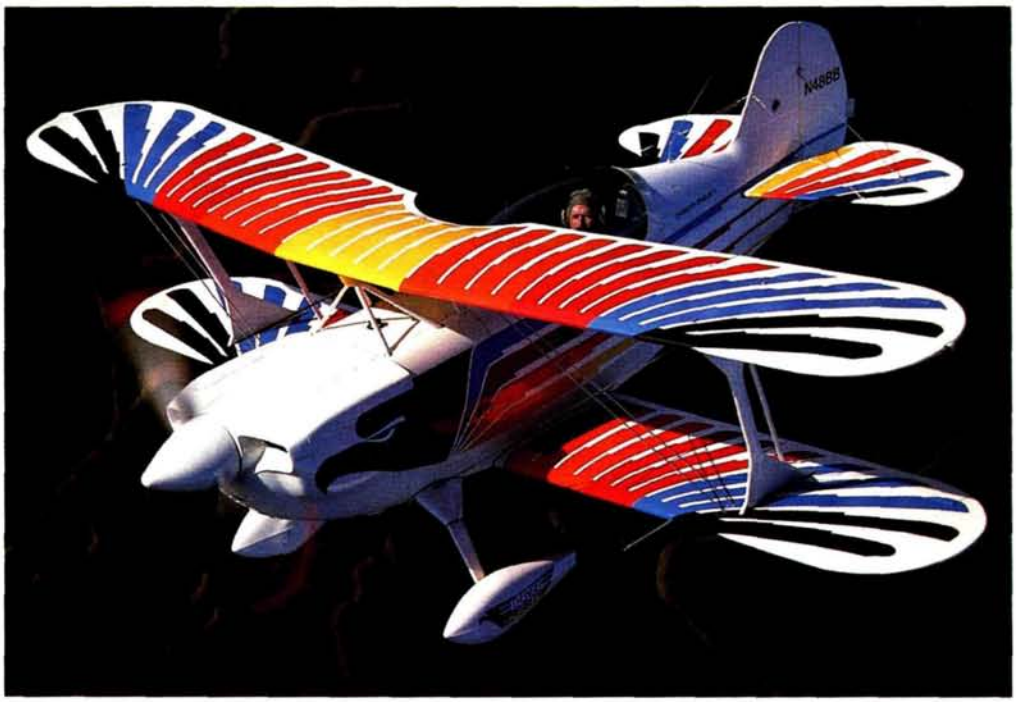
Like an integral part of the environment, the Eagle graces the Florida coastline in an inobtrusive way.

article and photos by BUDD DAVISSON

Eagle Territory

WHAT HAS BRIGHT colored fabric feathers and goes like stink? The answer is easy, the Christen Eagle, the universally accepted symbol for three-dimensional fun in the sun. It also represents the absolute pinnacle in perfection as it applies to the so-called "kit-plane."

The Christen Eagle is the aeronautical personification of Frank Christensen. Frank is a man who can only be described as a true mover and shaker who knows only one way to do things—the right way plus a bunch. Founding an electronics company when he was still in college, he became so successful that when he was bought out by a larger firm, he suddenly found himself a young, aerobatically-oriented multi-millionaire. At that point he desperately needed a place to invest not only his money but also the boundless energy that marks men who



are prone to that type of success. So, he founded Christen Industries on his fly-in ranch in Hollister, California, and began producing super high-quality components for aerobatic aircraft. His products include seat belts, inverted fuel and oil systems, and wobble pump/gascolators. Actually, to say that he "produces" these items is to oversimplify, since anything his company produces is so high in quality as to be outrageous. And, yes, to answer the next question; you pay more to own the very best.

In the early 1970s, not content with the current crop of aerobatic airplanes, the Pitts Special and the still-being-developed Laser, Frank decided to get into the airplane design game. Initially the design would be for his own use, but later for public consumption as well. Although he actually hasn't said as much, certainly part of his dissatisfaction with existing airplanes has to do with trying to fit into a Pitts Special when you are in the neighborhood of 6 feet, 2 inches tall. At one point Christensen did purchase an unfinished S-2A airframe with the idea of modifying it for his own use. However, that project was never finished since he decided to start from scratch and design his own airplane.

It isn't known whether he actually planned on developing such an unbelievable kit or whether it just "growed" as he went along. Regardless, the final result is an airplane kit that truly is as snap-together as you can get with an airplane and it is the standard for all others to strive for. Approaching it as only he knew how, the Christen Eagle kits surpass even the finest R/C kit in terms of attention to detail, completeness, and well-thought-out instructions.

(Continued on page 45)

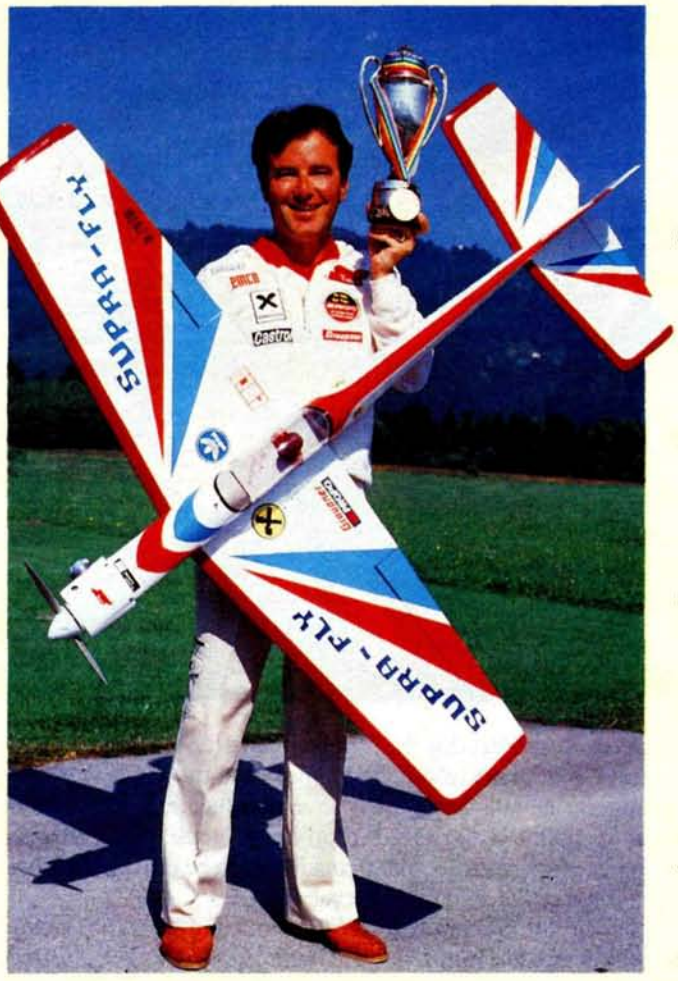
Supra-Fly

Designing the perfect competition aerobatic airplane.

In any area of competition, there is usually one name that is synonymous with number one, such as Mario Andretti of Indianapolis racing fame or John McEnroe in tennis. In the competitive aeromodeling arena there is one name that is instilled in the minds of most modeling enthusiasts as the best. The name is Hanno Prettner. He has dominated every major R/C world event for over a decade, including the prestigious Tournament of Champions. His objective when designing the Supra-Fly was to build the ultimate competition R/C plane. Presented here are a few of Hanno's thoughts on the Supra-Fly. —The Publishers

by HANNO PRETTNER

BEFORE I went to the '85 World Championships in Flevohof in the Netherlands, I received from the Dutch Civil Weather Forecast Bureau all the necessary information regarding humidity, air pressure, and winds. When I had this information, I started to calculate my new model Supra-Fly. I wanted to design a perfect model for Flevohof conditions and for the new Turnaround maneuvers. I thought the model should have a weight of 3,600-3,850 grams and it must not be so big in wingspan (1,650-1,700 mm) because of the high wind speeds and turbulences. The appearance had to be similar to a full-size aircraft and the most important thing: the design had to be very easy and simple to build.



Most competition models are getting too expensive, especially for younger pilots. This is the reason why I wanted to show everybody that it is possible to win with a simple model. Of course, I'm using the best equipment, which is a JR PCM 9 with dual rate and exponentials. This gives me the possibility of trimming the model for my personal feeling.

Using a two-wheel landing gear gave me no problems, even on rough grass and stony airfields. The gear is built into the wing in the right position and therefore my Supra-Fly never went on its nose. As you might have seen, my takeoffs and landings at the World Champs in very heavy crosswind were without trouble. The two-wheel gear makes a good combination with the half-hidden pipe under the wing. You have no heating problems and if you turn the engine to 50° down, on a side exhaust you can use standard manifolds.

Also, unlike an inverted engine, it is not necessary to turn the model on its back when you want to start it.

On the Supra-Fly prototype we tested five different wings and airfoils. For testing we went to Gorizia, Italy, where we had similar conditions to the Netherlands.

After selecting the perfect wing size and airfoil we built three Supra-Flys totally like one another. All the models flew exactly the same and for the World Champs I had the problem of deciding what model I should fly.

By the middle of August all setups of the models were finished and we decided to test the model (as yet without a name) at the biggest European international contest. I was able to win this competition many points ahead of Wolfgang Matt, followed by the top German pilots. This success proved my Supra-Fly design and I was very motivated for the World Champs. During the many practice flights I did, no problems occurred. It was not necessary to change one servo or electronic part, and therefore I am really satisfied with my JR radio.

In the month before the World Championships I tried to fly four or five flights every day. I don't like to do more than five flights because after five flights you lose concentration and then you cannot improve any more. All my practice flights are done in the same way like competition flights: my father watches very carefully and then we repeat not-perfect maneuvers.

For this year's World Champs we had the new 1,000-point scoring system. Therefore, my tactic was trying to

(Continued on page 95)

GIANT STEPS

by DICK PHILLIPS

I HAD AN INTERESTING letter from Paul Byrum of Simpsonville, South Carolina, a while back. He gave me some information about his club's activities, saying that giant-scale continues to grow in his area and expressed gratitude that it was mainly in scale models. The most interesting point Paul raised was that they had reduced interference between AM and FM transmitters at their annual ralley at Hartness Field by separating the AM and FM transmitters into two groups which flew from different areas.

Paul attended the IMAA Festival in Mobile, Alabama, and said he saw a good deal more interference there than at his club's ralley. I'm not qualified to judge whether or not this method is sound from a technical standpoint, but it does seem to make sense. The frequency problems I've heard about seem to occur when transmitters are close together. Removing them to a distance makes sense. Has anyone else had experience with this? If so, I'd like to hear about it. You might try the method at your next gathering and let me know if it works.

New Plans Available

I had a note from A. Lynn Lockrow*, the Monocoupe enthusiast who has several good Monocoupe plans and is working on more.

If you're a Monocoupe fan, Lynn has some great plans for you. Currently underway is a plan for a 1/3-scale Monocoupe 90A, which I've been waiting to see for a while. The 1/4-scale model plan (available from *M.A.N.*, #2811 for $16) is about right for two-stroke or a larger four-stroke glow engine, but too small for the gas engines. Lynn's rendering of the 1/3-scale Coupe should be just right for the small Quadra. Judging by his work in the past it will also be right on scale and will probably permit the making of an FAI scale model.

Seen at the Rochester rally, Jerry Joseph's scratch-built S.E.5 took five years in the making from John Lowe plans.

Speaking of plans, Henry Haffke* has a number of plans for many of the Granville Brothers' great airplanes. The Gee Bees are well-known, as many were famous racers in the '20s and '30s, but there was more to the Gee Bees than racing. Haffke has eight plans at last count and they're all for large models. These include the Gee Bee R-1, the Weddell-Williams Racer, the Gee Bee Model Z, Frank Hawks' Time Flies, the Gee Bee Model E, the Gee Bee Model D, and the Gee Bee Zeta. This is about as fine a collection of classic racers and sport machines as you'll find anywhere.

Michael Beaulieu of Beaulieu's Plan Service* has added a couple of large plans to those already available from

Right: Noted scale builder Ralph Jackson brought his D.VII to Rochester, built from Smithsonian three-views. Far right: Paul Weigand's Culver Dart, also at Rochester, had incredible detail.

him. A Piper PA-18 Super Cub and the EAA's Skyote are ready for shipment, along with a selection of models in more conventional sizes, including an A-26 for two .50s, an A-10A Thunderbolt II, a Razorback Mustang, and a Japanese Zero designed by Hal Parenti. Michael informs me that he has approximately 25 more plans lined up for release over the next two years, a most impressive schedule to say the least.

The way plans are increasing, there will soon be well over 200 different plans available for large models. As suggested by my readers, I'm in the process of compiling a series of directories of the large plans currently on the market. The directories will include 50 plans per volume and each plan will be reviewed as to ease of construction in detail, and will include a historical reference to the original airplane. Additionally, a source list of documentation on all models listed will be in each volume. The first of these is almost ready to go to the printers.

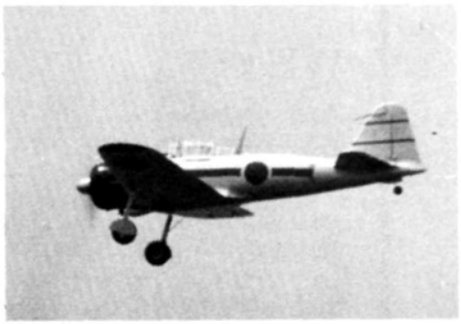
Left: S.T.A.R.S. Rally '85, Jack Munn's scratch Ryan STA used Quadra 35. Below: Rochester rally, John Taylor's 8-foot Loening M-8. Right: Hamburg, PA, rally, Carl Dannenhower's Zero from Ziroli plans.

S.T.A.R.S. News

Lou Eltscher of the Olean, New York, S.T.A.R.S. club was good enough to send me some photos of recent activities in his area. Obviously giant-scale is alive and well in New York, judging by the caliber of the models.

The S.T.A.R.S. group headed by George Privateer, who is also the *S.T.A.R.S. Dust* newsletter editor, is well-known almost everywhere. Their rollicking good humor and their ability to build great models is second to none. I've been in touch with them for many years and think of them as good friends, even though there are some I have yet to meet.

Left: Seen at S.T.A.R.S. '85 rally was Ron Mascioni's 96-inch Antoinette. Above: Steve Gray's well-flown DeH-86B. Right: Tim Farrell's 86-inch, 17-pound scratch-built Fokker D.XXI, powered by ST 2500.



Zenoah G-38 on Nosen Big Stik

I had a note from Ray Teliczan Jr. from Millstadt, Illinois, commenting on his use of a Zenoah G-38 in a Nosen Big Stik. Ray says he has had good service from the engine and is very happy with its performance, which bears out my own experience. I did have a problem with the spacer block between the carburetor and the crankcase. It's made of metal and could transfer enough heat to cause vapor lock in the carburetor. Ray mentioned that his carburetor had been rotated 180° which would require it to have another spacer block. If this is made of a fiber material, which insulates the heat from getting to the carburetor and prevents vapor lock, it would explain why Ray hasn't had a problem with it.

Ray obtained his engine from P.K. Products* in California and they may have changed the block at the time they turned the carburetor around. Some of the Bully engines also have a metal spacer and these should be changed if at all possible. I'll get some material together and try to come up with a design for what is required.

(Continued on page 73)

Engine Review Round-Up

O.S. MAX-21FSR-B

by PETER CHINN

O.S. offers an extensive range of engines for paved circuit racing and off-road operation. The Max-21FSR-B side exhaust is a buggy engine.

AS EXPLAINED in our recent review of the Max-21VF-R engine, the O.S. company manufactures 3.5cc class R/C car engines in both rear exhaust and side exhaust models and in track-car and off-road versions. As was noted at that time, the rear-exhaust 21VF-R made an impressive start, within a month or two of its introduction, by taking second place in the 1985 World Championships for one-eighth scale circuit racing cars. This month, by way of contrast, we are covering the side-exhaust 21FSR-B off-road or "buggy" engine.

As is to be expected, the various models in the Max-21 range (all of which have the same bore and stroke) share certain parts, but there are a lot of differences between the rear exhaust circuit racing engine and the side exhaust buggy engine and none of the components of these two engines can be interchanged.

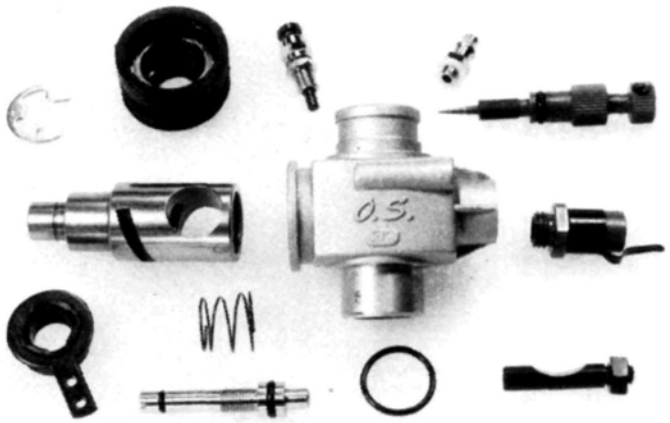
Externally, of course, the differences are easy enough to see. Quite apart from its main casting which, unlike the rear-exhaust engine casting, has an integral front housing, the buggy engine uses the special curved-fin cylinder head that was first seen on the original Max-21VF-B rear-exhaust buggy engine introduced in 1984. The purpose of this is to ensure that the fins are correctly exposed to the cooling airstream irrespective of whether the type of transmission used requires the engine to be mounted north-south or east-west on the chassis. Because six screws are used to secure the cylinder-head, it is not possible to rotate the head through 90 degrees. Therefore, the head fins are curved in such a way that a 60 degree rotation will continue to present the fins end-on to the airstream.

Unlike the 21VF-R, which is fitted with one of the new O.S. Type 2S slide-throttle racing carburetors, having a massive 54 sq mm choke area, the 21FSR-B, as befits a buggy engine, has a Type 2K barrel-throttle carb with a more modest 38 sq mm effective choke area. Mixture is drawn through a slightly shorter valve port in the twin ball bearing

SPECIFICATIONS

Type: Air-cooled, single-cylinder, side-exhaust two-stroke-cycle with crankshaft rotary-valve and Schnuerle scavenging.
Bore: 16.6 mm (0.6535 in.)
Stroke: 16.0 mm (0.6299 in.)
Displacement: 3.463cc (0.2113 cu in.)
Nominal Compression Ratio (full stroke): 11.5:1
Speed Control: O.S. Type 2K adjustable automatic mixture control carburetor.
Checked Weights: 304 grams (10.7 oz) less air cleaner; 337 grams (11.9 oz) with air cleaner.
Mounting Dimensions:
Crankcase width: 30 mm
Length from driver face: 77 mm
Height above CL: 75 mm
Bolt hole spacing: 38x15 mm
Manufacturer's Claimed Power Output: 1.0 bhp at 24,000 rpm.
Manufacturer: O.S. Engine Manufacturing Co. Ltd., Higashisumiyoshi-ku, Osaka 546, Japan.
U.S. Distributor: Great Planes Model Distributors Company, P.O. Box 4021, Champaign, IL 61820.

Left: Curved fin head can be rotated for best airflow. Below: Type 2K carburetor provides adjustable automatic mixture for best throttle response.



Parts exhibit usual O.S. attention to detail and high-quality manufacturing.

crankshaft, but valve timing is basically the same at 35 degrees ABDC to 65 degrees ATDC.

Cylinder port timing, on the other hand, is slightly more modest at 168 degrees for the exhaust and 124 degrees for the inlet ports. Scavenging, needless to say, is of the Schnuerle-plus-third-port type, but with three inlet ports instead of four. As with all the 21FSR series engines, the hard-plated brass cylinder liner is rotated in the casting to bring the exhaust port to the right rear quarter. The bypass flutes in the casting are repositioned accordingly to line up with the sleeve ports. This feature, first used several years ago on the O.S. Max-25FSR engine, was adopted for purely practical reasons: it provides a continuous cylinder wall surface, uninterrupted by ports, for the Teflon end-pads of the full-floating wristpin. The engine is, of course, of the ABC type with a convergent bore and finely fitted ringless aluminum piston. The conrod is of machined high duty aluminum and is bronze bushed at both ends.

In common with other O.S. buggy engines, the 21FSR-B is supplied with a large, plastic-bodied air-cleaner of the replaceable-element type. It comes complete with two small and two large elements that can be used in different combinations according to the severity of the off-road operating conditions.

O.S. claims a substantially lower peak power for the Max-21FSR-B than for their track racing engines, but the rated output of 1.0 bhp at 24,000 rpm is, needless to say, still remarkable for an engine of only 3.5cc displacement and reflects the astonishing strides that have been made in model car engines during recent years.

Peter Chinn, *Model Airplane News*, 632 Danbury Rd., Wilton, CT 06897. ■

Engine Review Round-Up

SAITO FA-65

by PETER CHINN

The new FA-65 bridges the gap between the 30-45 size Saito four-strokes and single-cylinder FA-120.

SPECIFICATIONS

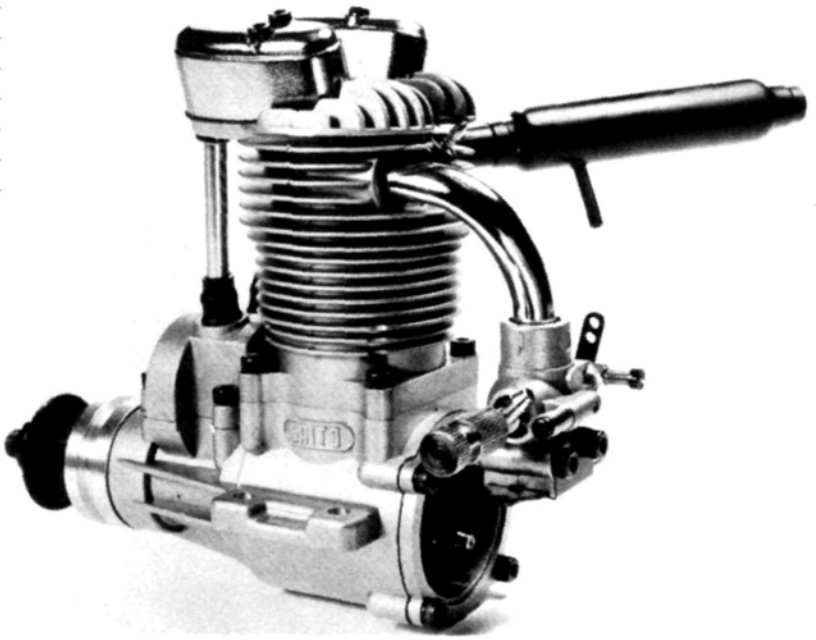
Type: Air-cooled, single-cylinder, four-stroke-cycle with pushrod operated overhead valves.
Bore: 24.8 mm (0.9764 in.)
Stroke: 22.0 mm (0.8661 in.)
Displacement: 10.627cc (0.6485 cu in.)
Nominal Compression Ratio: 10.5:1
Speed Control: Saito barrel throttle carburetor with fixed automatic mixture control and adjustable airbleed.
Checked Weight: 534 grams (18.8 oz)
Mounting Dimensions:
Crankcase width: 40 mm
Length from prop driver face: 122 mm
Height above CL: 96 mm
Bolt hole spacing: 50x21 mm
Manufacturer's Claimed Power Output: Not stated.
Manufacturer: Saito Seisakusho Ltd., Ichikawa, Chiba Prefecture, Japan.
U.S. Sales: (i) Tower Hobbies, P.O. Box 778, Champaign, IL 61820.
(ii) Hobby Shack, 18480 Bandilier Circle, Fountain Valley, CA 92728.

BEFORE THE SAITO factory switched its production to four-stroke-cycle engines several years ago, it manufactured, in addition to its line of marine steam powerplants, a series of .60 size model two-stroke engines in both glowplug and spark-ignition versions. It is rather surprising, therefore, that, in subsequently assembling a range of four-strokes in seven different displacements from .30 cu in. to a 2.75 cu in. twin, a .60 was the one size that Saito seemed to ignore. In fact, so far as the Saito single-cylinder four-strokes are concerned, there was nothing between, on the one hand, the FA-30, FA-40, and FA-45 and, on the other hand, the big FA-120. Until recently, that is. Now, Saito has bridged this gap with the new FA-65.

The FA-65 has most of the usual Saito features. These include a front spur-gear driven camshaft, with enclosed pushrods to inclined overhead valves, each individual rocker assembly being enclosed in a neat streamlined rocker box. The crankcase has an integral front end and a separate bolt-on cylinder unit. The engine is unmistakably a Saito in external appearance.

However, as readers who have followed our test reports on Saito engines will be aware, designer/manufacturer Gen Saito has adopted many different combinations of piston/cylinder assembly and the FA-65 marks yet another change.

Saito's first four-stroke, the FA-30 of 1979, was the first production model



four-cycle motor to use an ABC setup. The cylinder casing was cast in unit with the crankcase and the ringless aluminum piston ran in a drop-in chromed-bore brass liner, retained by the detachable cylinder-head in the usual way. A change was made with the appearance of the FA-40. Here, the liner was dispensed with and the hard-chrome bore plating was applied directly to a new finned aluminum cylinder barrel which was made detachable. This form of construction was also used for the FA-45, the Mk.I and Mk.II versions of the FA-80T twin and the FA-90T Mk.I but, for the FA-90T Mk.II, a completely new cylinder casting with an integral head and a steel liner was adopted. This, of course, also entailed a switch to a ringed aluminum piston. A similar setup was adopted for the big FA-270T twin.

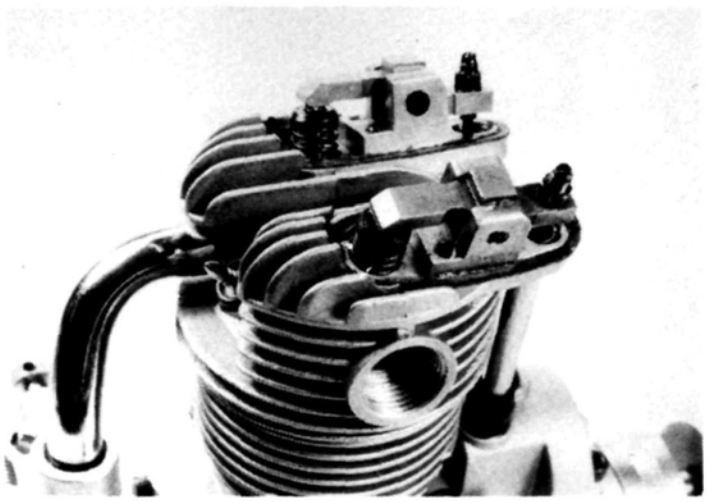
Now, with the FA-65, yet another change has been made. The integral cylinder-head and ringed piston are retained, but the cylinder liner reverts to a chromed brass sleeve. Theoretically, this will mean better heat transference than with the steel liner, while the continued use of a ringed piston means that a new piston and ring can be fitted without having to replace the cylinder.

The FA-65 has the same piston stroke (22 mm) as its immediate 10cc four-stroke competitors, but has a larger cylinder bore (24.8 mm) to give it a slight displacement advantage at 10.627cc, or just under 0.649 cu in. Yet it is the lightest of the group at only 534 grams or just over 18.8 oz. Compression ratio checked out at a surprisingly high 10.5:1.

A new carburetor has been adopted for the FA-65. Instead of the two-needle adjustable automatic mixture control type used for the 30-45 size Saito four-strokes, the new carb has fixed automatic fuel metering via a tapered spiral groove in the end of the throttle barrel. A similar system of fuel metering is used by the big FA-120 and FA-270T models except that these have provision for manual adjustment to set the idle mixture. On the FA-65, fine-tuning of the idle mix is via a separate adjustable airbleed.

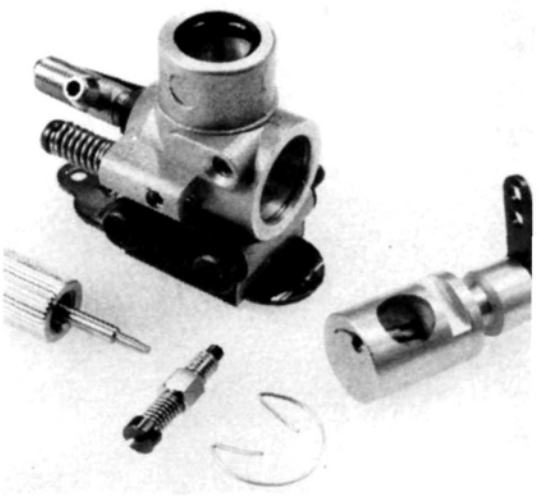
To sum up, this looks like another useful addition to the Saito four-stroke range. We hope to run a full test report on the FA-65 in due course.

Peter Chinn, *Model Airplane News*, 632 Danbury Rd., Wilton, CT 06897. ■



Above: Design and appearance follow familiar pattern. Muffler and choke device included.

Above: Inclined valves are Saito tradition. Rocker covers removed to show neat valve gear. Right: Saito carburetor has automatic fuel metering via tapered groove in end of throttle barrel.



HOW TO:

by RANDY RANDOLPH

MAKE WIDE BALSA SHEETS

There are a number of uses for wide balsa sheets; fuselage sides and the skin for foam wings being two of the most popular. Although wide balsa sheet is available, it's not always the thickness, or width, you need. The photos show how to join two or more standard sheets to form any width needed.

1.

2.

1. Although they may appear straight, the edges of balsa sheets are not necessarily true. Use a metal straightedge and a razor knife to straighten any bow in the edges. Hold the knife as near vertical as possible when making the cuts.

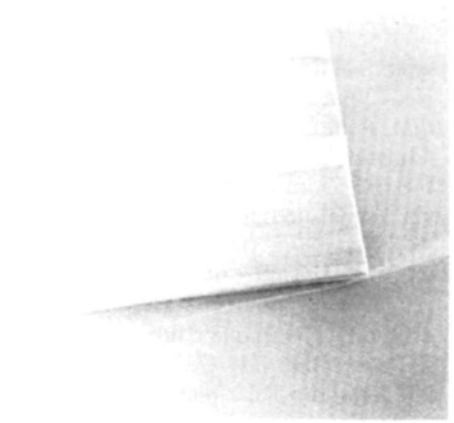
2. Join the edges to see if the fit is smooth and tight. Use the edge of the workbench as a guide for the sanding block and smooth out any imperfections. The edges should join with no voids.

3.

4.

3. Hold the edges tight against each other and apply masking tape to the seam the full length of the sheets. Keep holding the sides together as the tape is smoothed securely against the wood.

4. Turn the sheets over and let them fall into a house-top configuration with the joint open. Run a bead of slow cyanoacrylate (Titebond, Ambroid, etc., work fine too) along the entire joint and press the sheets down flat to close the joint. Wipe off any excess glue.

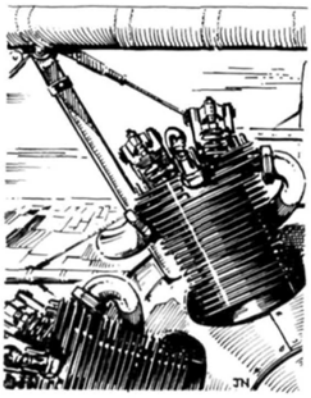


5.

6.

5. If one of the slow-setting glues is used, Titebond for example, turn the sheets over with the glue joint down on a piece of waxed paper and hold them flat with books until the glue has set.

6. After all joints are complete and the glue has cured, lay the sheet on a flat surface and sand it smooth. Use a sanding block and sand both sides, not just the glue joints, and the task is complete. This method of obtaining wide sheets is considerably less expensive than purchasing them.



FOUR-CYCLE FORUM

by ELOY MAREZ

A SPARK ignition for the Kavan FK-50 engine has recently become available that should be much more acceptable to most owners of this engine than the one originally furnished. The older system made for the FK-50 worked well, but it was too complex. It was too bulky and too heavy; most of us considered it to be over-engineered for this application. It was claimed to work at up to 30,000 rpm and at extreme temperatures that are impressive to electronic equipment designers, but far too extreme for model work.

The new spark ignition system is more in keeping with what most of us seem to need in this respect. It's small and lightweight, and it works at the speeds and temperatures that we normally encounter—what more could you ask for? All of the electronics are enclosed in a single, firewall-mounted package measuring merely 1x1⅛x2¾ inches, and weighing just over 3 ounces. The pickup system uses Hall Effect sensors, with that part of the system being located on the rear of the engine, enclosed in the housing that contains the valve cam gears. In fact, the magnet for the Hall Effect system is mounted on one of the gears.

The system includes a timing retard feature, also included in the distributor electronics package. Ignition takes place on both upward strokes of the piston; the plug also fires on the exhaust stroke. This is not uncommon with spark ignition twins and doesn't seem to affect operation in any way. The battery requirement is a common four-cell nickel-cadmium pack, and current consumption at full throttle is about 250 mA. So even if you fly around at full bore *all* of the time, you'll still get one hour of flight time from a set of 500-mA cells. Naturally, for longer times you can go to larger cells or have some method of field-charging your battery.

I've heard from one of the first users of this system, Martin Zeller of West Chester, Pennsylvania, who has the following to report:

"The new system is very simple, and with a 550-mAh battery only adds about 8 ounces. As with the previous system, it adds approximately 200 rpm to the top end, resulting in approximately 2 pounds of static thrust. For vertical maneuvers, this results in a net of approximately 1½ pounds of thrust. Boy, does it climb now! Due to weather and lack of time, I've only been able to get two flights on the system but everything has been flawless to date. I trust that the system will continue to be reliable.

"Utilizing my World Engines Expert III R/C system without any filters, chokes, or suppressors, I conducted normal radio range checks with the engine running and found no radio problems at all."

As far as I know, the sole importer/distributor of the Kavan FK-50 here in the U.S. is Hobby Shack*. I understand that sometime this year, all FK-50s will be spark ignition equipped, though the system is available for retrofit, and is priced at $280. I expect to have more news on the subject of retrofits in the near future, but if you can't wait for it to be reported here, please write and I'll try to bring you up to date.

Hall Effect

I hate reading something that touches lightly on a related subject, assuming that I know all about it, such as in the case of the "Hall Effect" mentioned above. For those of you who are wondering "what's he talking about?" I'm going to discuss briefly this important part of model engine technology, as we are seeing more and more of them. In addition to the Kavan system mentioned, they're also used by the excellent C.H. spark ignition system, which probably has wider use than any other here in the U.S.

The Hall Effect was discovered by Edward Hall in 1879. He observed the phenomenon that when a permanent magnet was placed close to, and perpendicular to, a thin piece of gold through which an electric current was flowing, a voltage appeared at opposite ends of the gold piece. This voltage was affected by both the amount of current flowing through the gold and by the strength of the magnetic field.

Actually, little was done with this knowledge at the time and for many years after. The same applies to many other electrical principles; it took the development of solid-state electronics, the transistor, and integrated circuits before they were really put to work to any great degree. We now have very small, very lightweight, and very inexpensive Hall Effect elements, which actually develop much higher voltages than those observed by Hall. Coupled with the improved magnets now available, such as the samarium cobalt that makes those high-powered electric motors possible, it's possible to obtain very efficient and very reliable sensing and switching devices. They are widely used in speedometers, security systems, alignment controls, limit switches, thickness gauges, position detectors, tachometers, etc.—it's a long, long list.

Many different devices based on the Hall principles can be purchased, including one that has not only the sensing, but also amplifying, processing, and output circuitry. Such a device is called a Hall Effect Switch.

So what do we have in the Hall Effect pickup in our model engine? Well, we have a completely electronic, no-drag, no-friction, no-electrical noise replacement for those troublesome points that always need cleaning and adjusting. We have a magnet installed somewhere in

Four-strokers have become popular the world over. Meet Australia's Ian Watts with his half-scale Heath Baby Bullet Saito FA-270 twin for power.

the crankshaft or some crankshaft-connected part of the engine, which passes by a Hall Effect device at the proper time, thus triggering the circuitry that fires the plug.

For those of you who might care to experiment with spark ignition systems of your own using these little electronic wonders, some sensors and switches are available from Goldsmith Scientific Corp.*

Four-Stroke Problem

I got a letter from Ron Gamelli of Feeding Hills, Massachusetts, writing for the Pioneer Valley R/C Club. He states:

"I'm writing to you in regard to a problem many of our club members have been having with four-stroke engines. After only a year or less of running, they develop compression leaks past the exhaust valve seat. You can hear air leaking past the valve seat if you place your ear close to the exhaust stack and turn the engine over by hand. We took several of the engines apart and placed the head assembly under water. We then blew through the exhaust pipe and could see bubbles leaking past. The intake valve showed no leakage. We've tried cleaning the seat and even did a little lapping, but couldn't stop the leak. We tried replacing the valve, but this didn't work either. I can't see having to replace the head assembly to correct this problem, as they are very expensive.

"We're not leaning out our engines for the maximum rpm and have been using regular two-stroke fuel. I've been running Red Max mixed at 12% nitro, 10% castor, and 10% synthetic. The engines run fine until they start losing compression. I purchased a brand new O.S. 1.20 on which I could hear air leaking past the valve seat before I even ran it. We haven't read anything about this problem and can't believe we're the only ones having trouble."

The first point worth mentioning is one I've talked about before. We can all benefit from an exchange of information, pro or con. I'd like to repeat my invitation to any of you who have comments or suggestions, good or bad, about four-stroke engines, to drop a line or two. As

(Continued on page 94)

Tech Tips

How to Set Up an Outboard

by CHARLES BEECHER

FOR THE experienced builder, there are lots of "how to" articles written on boats, but there is very little written for the beginning boater or for the person who is all by himself. There can be quite a few problems, so I'd like to try to help you solve some of them.

First, when building a boat, the running surfaces should be *true* and *square,* or at the proper angle that the manufacturer has designed into the boat.

The transom of a tunnel boat or V-bottom boat should be at a 90° angle to the bottom of the boat. If you do this, nine out of ten boats will not need to be trimmed for prop angle to the water. If you have to change the prop angle, you can do it by putting washers between the transom (or adjustable motor mount) and the motor mount.

All of the boat's running surfaces should have sharp corners. If a corner is rounded even a little, water is likely to stick and come up the inside of the tunnel, or up the outside edge, and slow the boat or make it unstable.

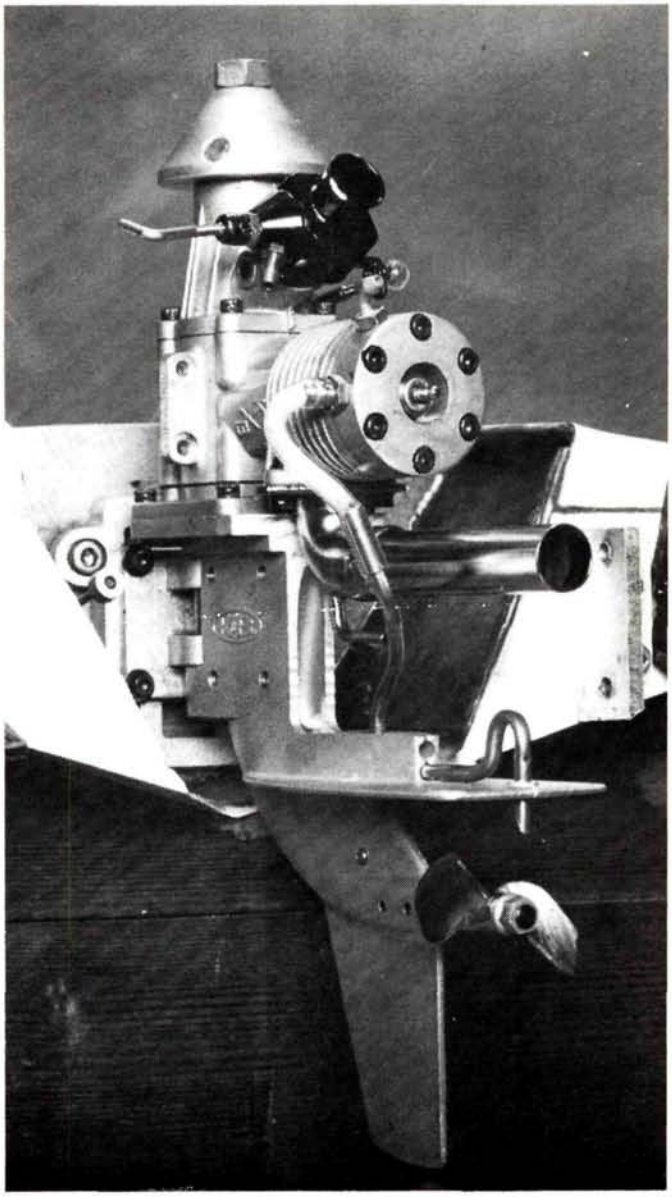
The beginning boater should not try to run his boat as a surface drive boat. The boat can become very unstable, unless you know what you're doing. Some outboard boats are not designed to be run as a surface drive.

The center of the propeller shaft should be ⅛- to ¼-inch deep below the sponsons, or somewhere in this area, to help keep it stable. To achieve this variable running depth, you should use one of the adjustable motor mounts that are on the market. When you run your motor deep, you should use a JG-C-20 prop, or something comparable.

Put the motor on the adjustable motor mount in a low position. This will allow you to raise the propeller at a later date to make the boat a surface drive or semi-surface drive to get more speed out of the boat when you are able to handle it well.

When you're running the boat, if you want to raise the front of it, put washers between the adjustable motor mount and the motor mount, using the two bottom bolts. If you want to lower the front of the boat, put washers between the adjustable motor mount and the motor on the top two screws. This is one way you can trim your boat.

One of the most important parts of the boat is the radio box. I like to build the radio box out of ⅛-inch plywood Hot Stuffed together, then I use an old nylon stocking and insert the box into the stocking and resin it together. I cut a piece of wood ¼x½-inch to fit around the inside of the radio box and put this ¼ inch down from the top of the radio box. This will allow for the waterproof seal (any closed foam tape) and the Plexiglas or plywood cover to fit flush with the top of the radio box. You can use screws or bolts and blind nuts to hold the radio box cover down, but screws tend to strip out after being used a few times. This procedure creates a waterproof box to mount your servos in and install your radio.



The proper setup of your outboard motor is essential for optimum performance and a true run.

Install your servos and check the rotation before you put the holes in the box. "Pull" should make the boat turn right. Be sure you use a good waterproof seal in your radio box.

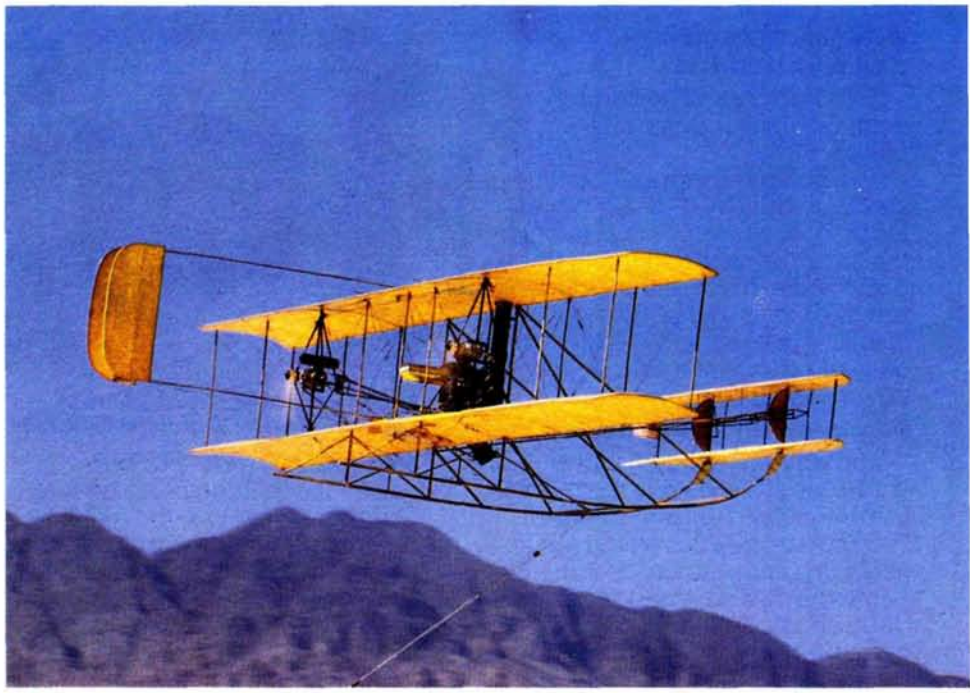
K&B Manufacturing* and Model Marine Racing Specialties* make the only throttle control I know of that the beginning boater can install with ease.

**The following are the addresses of the companies mentioned in this article:*

K&B Manufacturing, 12152 Woodruff Ave., Downey, CA 90241.

Model Marine Racing Specialties, 2440 Andre Ave., Janesville, WI 53545. ■

1985 QSAA RALLY



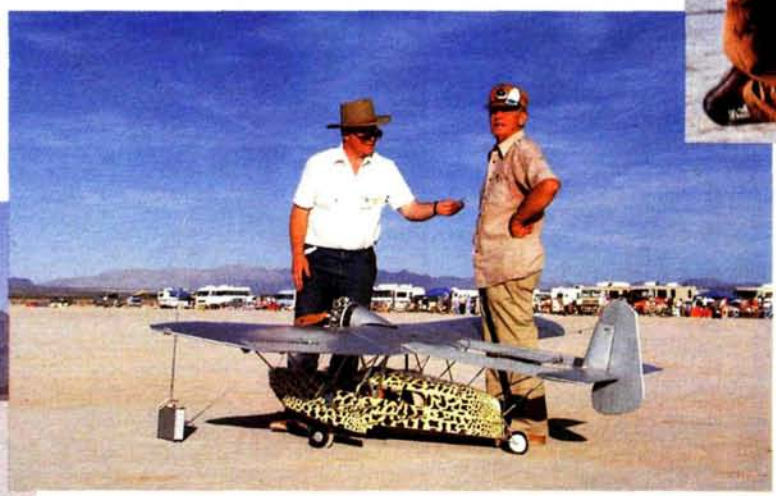
by DICK PHILLIPS and MIKE LEE

WHY WOULD ANYONE intentionally stand out all day in a dry lake bed in the middle of a baking desert for three days in late October? It's hot, there aren't many creature comforts, and it can be dusty and quite uncomfortable. The reason for such strange behavior from hundreds of people is the Quarter Scale Association of America Rally, a meeting of enthusiasts of large models from many parts of the world.

The QSAA has been holding a rally in Las Vegas for large models for almost 10 years now. It changed a good deal in the first few years as those involved learned more about hosting such a large event, but it hasn't changed much over the past few years. The fine-tuning was done in the early stages and many of the early errors have been eliminated. It has become a premier event worldwide and is now reported in model magazines all over the world.

The 1985 edition of the QSAA Rally was no exception. It was as good as any in the past and the weather cooperated flawlessly. There was no wind, which can turn the dry lake bed flying site into a veritable Sahara dust storm. The wind was all but dead calm over the three days of flying. The sun shone the whole time and many fine models were flown, and flown well.

The event is headquartered at the Showboat Hotel, which provides a large display area for the static display. Models are not required to be shown, but many bring their creations for the admiring glances of their peers and the general public. The QSAA does a good deal of work to set up this one-day display and



This fantastic Wright Flyer by Jorg Vogelsang won Best of Show. Power was two O.S. FS-120s.

the President, Rex Perkins, works as hard as anyone at setting up tables and organizing the area.

There are always some outstanding models at such events and this year was no exception. Jorg Vogelsang from West Germany brought a Wright Model A Flyer which was very popular with spectators and pilots alike. Jorg has dazzled us in the past with his creations and is frequently asked, "What are you going to do for an encore?" Each year he seems easily able to top his effort of the previous year and gets full marks for his adventurous spirit and his abilities.

Jorg's Wright Flyer was a *tour de force*, flying well after the addition of some weight forward to produce a better balance and taking all who saw it fly back into time to the days of wooden airplanes and pilots with a good deal of raw nerve. Considering that the airplane has practically no tail, it was still tail-heavy and the addition of the nose weight settled it down very well indeed.

Jorg spent several years working with prototypes to learn how such a model would perform. The appearance and the performance of the model proved that his homework was well done. The model, contrary to its heritage, was made almost entirely of metal and the sample formed aluminum wing rib Jorg showed to those present was a tribute to both his ingenuity and his craftsmanship. The rib (and the wing) are under-cambered, as was the case with the full-scale machine. Over all, the model was in the FAI class and the only flaw pointed out was that the original fabric was applied on the bias and Jorg had chosen to apply his as most of us would have done, with the warp and woof lying along, and at right angles to, the centerline.

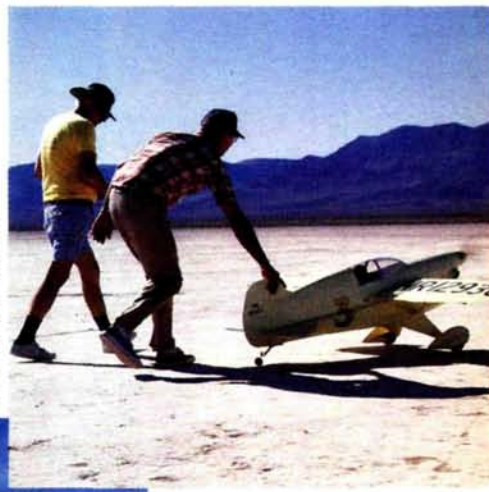
While the chain-driven props of the original were replaced with twin engines in the model, the chains were present, although not used to drive the propellers. At ¼-scale, such chains could have presented an unending headache to keep operating. The pilot figure was coupled to the controls and followed the movements imparted by the radio gear. Wing warping was used for lateral control and it worked very well indeed. All-up weight was 32 pounds and the model was launched using a modified Hi-Start, having no wheels on which to taxi. On Sunday, the rubber of the Hi-Start hung up and was lifted into the air still attached to the model. Consummate piloting skill managed to keep the model under control until the launch device dropped off and fell back to the desert floor.

Jorg Vogelsang's Wright Flyer was a most popular model with close attention being paid each time it was flown and a round of applause after each flight. Once again, Jorg took Best of Show with the Wright Flyer, an experience he has had in the past with other models.

Another fine model builder who is always recognized at Las Vegas is George Harlan from California. George has been in the winner category for many years and this time was no exception with his rendition of one of WW II's

(Continued on page 48)

photos by MIKE LEE

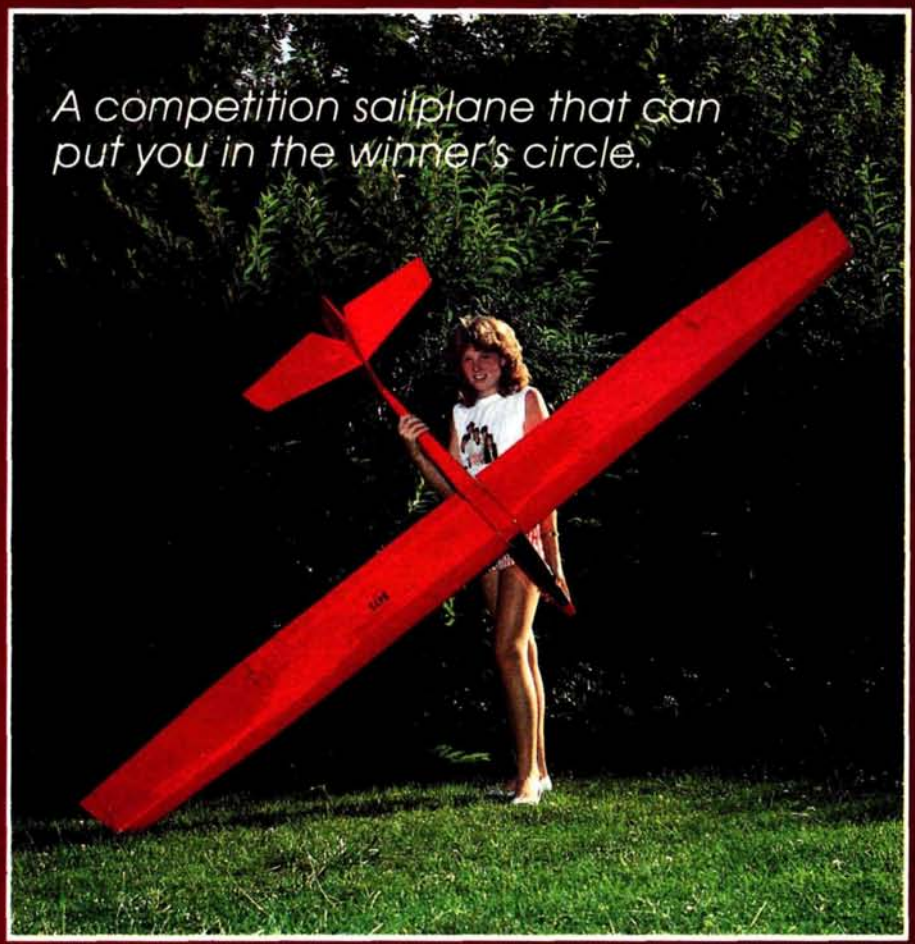


From bottom left, Jerry Kikkert with his F-82 and flight crew. Pilot was Bill Hempel. Mel Barber from South Africa had a Sikorsky S-39 powered by a Technopower radial. Chuck Fuller with his beautiful PT-22, used a Sachs-Dolmar 3.7 for power.

Above: Bob Seigelhoff with his fine Chester Jeep that spanned 8 feet. Left: Nick Ribaldo's huge OV-10A Bronco won Best Multi-Engine award.

Firehawk

A competition sailplane that can put you in the winner's circle.



THERE has never been an airplane better named than the Firehawk. It possesses the attributes of the proverbial hawk! It's agile, able to work very light lift, and, best of all, it has an excellent lift/drag ratio. What a dynamite sailplane for thermal duration contests! Not only will the Firehawk go head-to-head with the best of the super ships, but its dynamic range is broader.

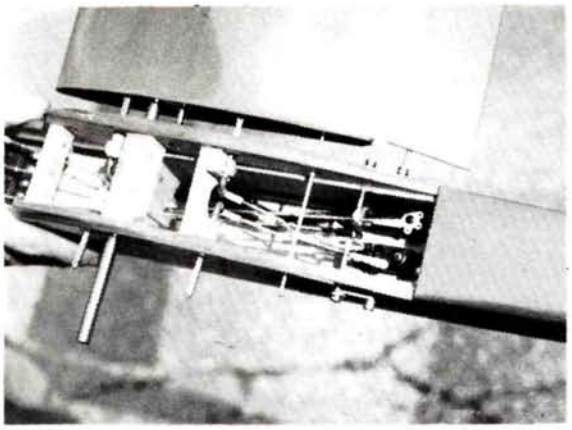
This plane is pure fun to fly. Launches are steep, arrow-straight, and high. In fact, launch height will be consistently higher than most sailplanes on the field. The Firehawk is a stable airplane and not very difficult to fly. Response to control inputs is positive and quick. It tracks in turns as if on rails, with no tendency for the nose to fall through into the center of the turn. If you do manage to stall, recovery is immediate and gentle. As a matter of fact, once the plane is settled down after towhook release, only minor corrections are needed every now and then to maintain straight-and-level flight.

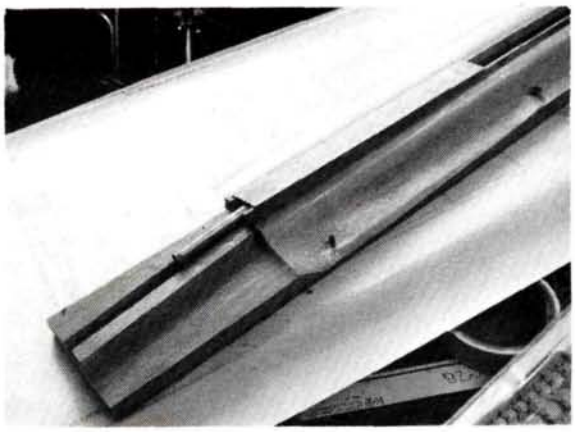
So far I've found no nasty habits. The plane will indicate lift just ahead of the confirming tone from the sniffler. I've been able to work turbulent, small-diameter lift about 50 to 60 feet from the ground back up to launch altitude. The thermal sniffler helps in centering the core and controlling pitch attitude while working lift.

Flaps/spoilers are required to slow it down for the landing, and once you get used to these landings, you won't want to land any other way. With practice, the plane's forward movement can be brought to a dead halt right over the spot at touchdown.

CONSTRUCTION. Construction of the Firehawk is rather straightforward and conventional. If you've built any of the more popular kits now available, the Firehawk shouldn't pose any difficulty. Try to save weight wherever possible, from the choice of wood to the application of glues. I used Pacer's* Zap glue.

This is a big plane at 125-plus inches of wingspan. You'll notice extensive use of composite structures and 1/32-inch ply as a means of increasing strength without increasing weight.





An intricate and complex arrangement, this design will challenge your skills.

Even so, the final weight is around 5½ pounds. As always, build the tail as light as possible. One ounce in the tail is several in the nose and that much more for the wing to carry. The investment in contest-weight balsa is a wise choice.

Pre-bend ⅛-inch balsa fuselage sides from F2 to the nose using water and ammonia. Glue the full 1/32-inch ply side to the inside surface of both sides. Glue the partial 1/32-inch ply side to the previously glued full 1/32-inch ply side. (Note: pre-feather the partial 1/32-inch side by sanding. Note area of feathering on the drawings.) Glue ⅛x¼-inch top and bottom longerons in place from F5 to the rear of the fuselage. Put both sides together and sand so that the sides are identical in outline.

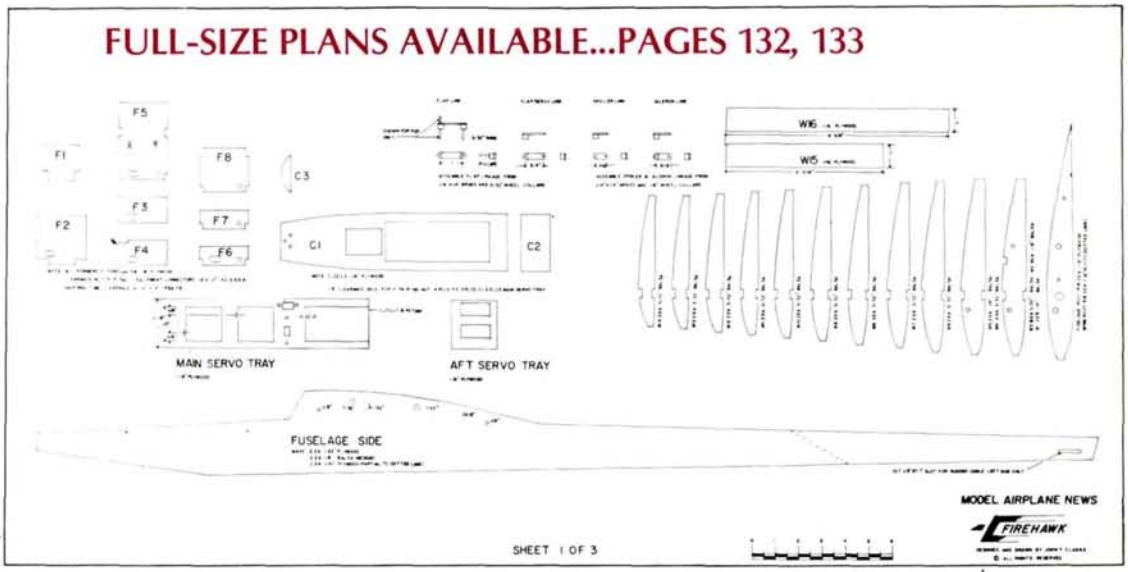
Temporarily clamp a straightedge along the fuselage side. The straightedge

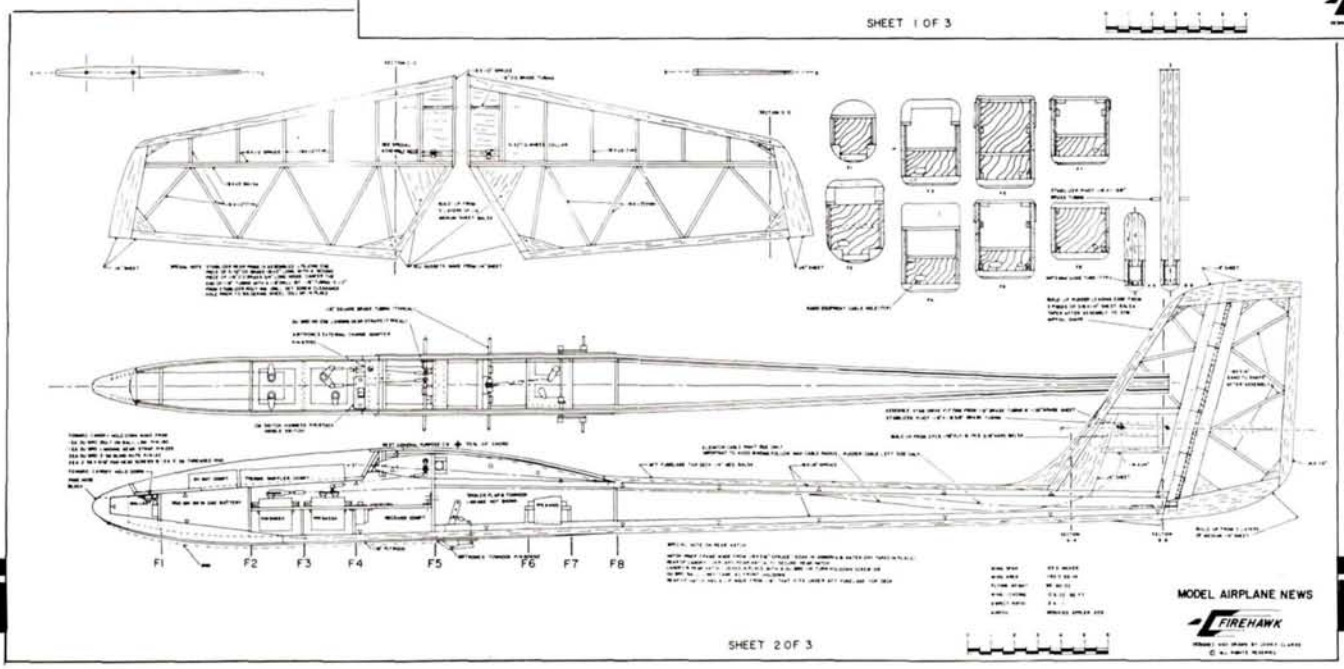
by John F. Clarke

SPECIFICATIONS

Type: *Sailplane*
Wingspan: *125.5 in.*
Wing Area: *1,192.5 sq in.*
Weight: *85-90 oz*
Wing Loading: *10.3 oz/sq ft*
Aspect Ratio: *12.4:1*
Airfoil: *Modified Eppler 205*

FULL-SIZE PLANS AVAILABLE...PAGES 132, 133



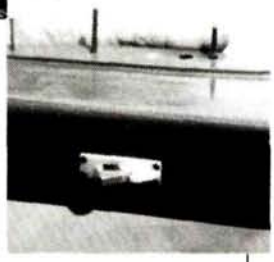


follows the canopy bottom line in the front and the fuselage top outline in the rear. Glue the fuselage wing root rib in place, flush with the straightedge. The front of the rib should just meet the canopy outline and the rear of the root rib where the top curve meets the flat top outline of the fuselage.

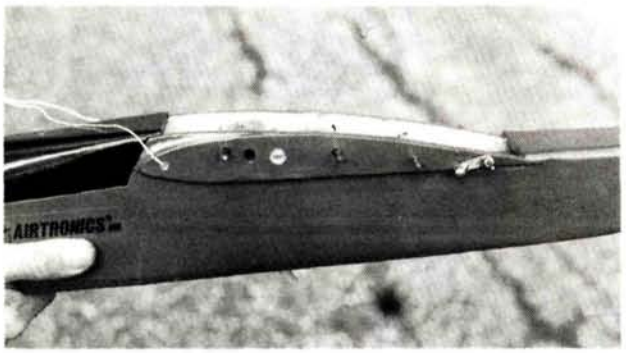
Assemble the fuselage module utilizing F2, F3, F4, and F5 to the forward servo tray. Make sure all formers are square to each other and to the servo tray. Use triangles and a flat surface.

Mark the position of formers F1 and F5, and formers F6 through F8 on the fuselage sides using the plans and a right

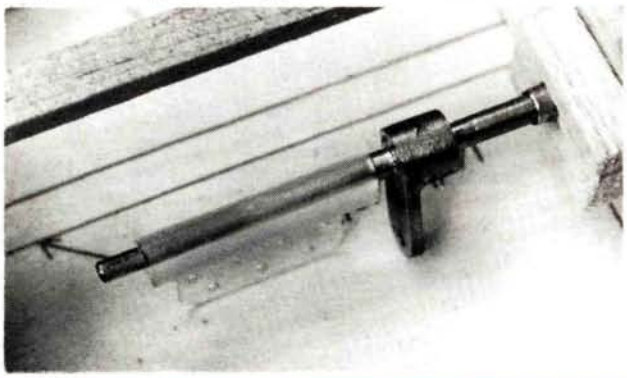
(Continued on page 112)

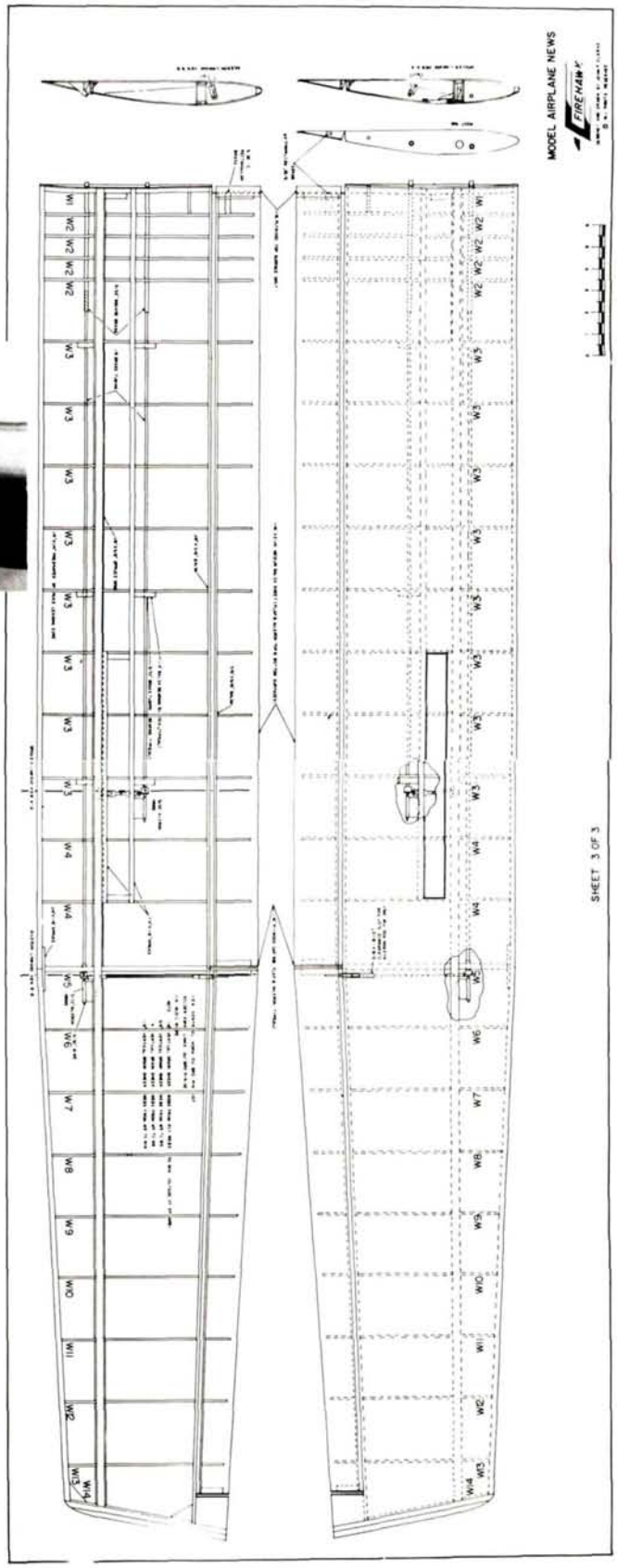


Tow release is from Airtronics.



Spoiler linkages are plugged in. Actuator seen below.





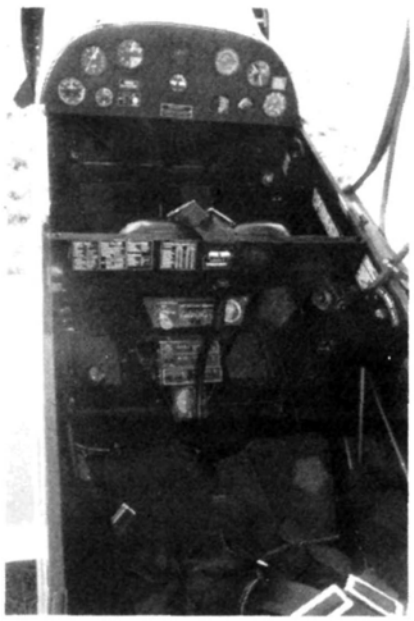
FROM THE COCKPIT

(Continued from page 21)

Ignoring the kit, the instructions themselves are a masterpiece in planning and presentation, and include exploded views and step-by-step assembly instructions that enable a middle-aged housewife from Bayonne who hasn't figured out her Waring blender to build a Christen Eagle.

Certainly one step of building a home-built airplane that scares just about every home-builder is the welding of all the steel assemblies. This step has been eliminated from the Eagle kit because the fuselage and all the other little goodies made of steel are welded and painted. In fact, the kit is so complete that early in the program, Frank had a hassle with the FAA concerning their 51% rule.

The dreaded "51% rule," which applies to home-built kits, says that the builder must contribute at least 51% to the finished product. As one would guess, since this includes material and labor, the establishing of what constitutes 51% isn't easy and is subject to a lot of interpretation. In the case of the Eagle, it meant producing a kit with uncompleted ribs. The first few airplanes had finished ribs but he had to change that procedure.



The way the kit reduces rib building to coloring book level is typical of the entire airplane. The builder receives a long piece of channel tooling into which he lays a piece of rib material, a strip of small, square spruce. By running a razor saw through grooves pre-cut across the channel, he winds up with the right number of shaped pieces. Then he pops these pieces into a rib jig that holds everything together with a clever arrangement of eccentric clamps. A little gluing and gusset stapling and the rib is done.

Left: cockpit setup with typical Eagle instrument panel. Above and right: The Christen Eagle has lines that appeal to modelers and full-scale types alike.

Certainly one of the most common comments about the Eagle is that it's a slicked-up S-2A Pitts Special, which to a certain extent may be true. However, the similarities between the two airplanes are more unavoidable than intentional. When you decide to build a high-performance, two-place, unlimited aerobatic biplane using a 200-horse Lycoming engine, there aren't a whole lot of things you can do that would be called wildly original or different. Just as the Travel-Airs and WACOs are similar, so are the Eagle and Pitts S-2A. Incidentally, any conversations about the similarity between the two airplanes have to include the fact that Frank Christensen owns both the Eagle company and the Pitts company. When he bought out Pitts Aerobatics, he became the producer of bipes of both home-built and factory-made varieties.

Structurally a Christen Eagle uses concepts that are as old as aviation itself. The fuselage is a welded steel tube truss mated to wooden, fabric-covered wings using built-up, truss-type ribs. Possibly the only divergence from tried-and-true biplane tradition is the use of a spring steel gear. These are the similarities it shares with the S-2A, as well.

Certainly some of the most obvious differences between the Eagle and the two-place Pitts are the wider fuselage (newer Pitts are also wider), the spring steel gear, the general cowling configuration, the canopy and the fact that there is no rear instrument panel—the pilot looks over the passenger's shoulder at the front panel.

Even though the Christen Eagle is the Heathkit of home-built airplanes, it's still a gigantic project. Many corners have been cut for the builder and hundreds and thousands of hours have been saved, but to complete the airplane to the standards expected will still take approximately 1,500 hours and maybe

(Continued on page 103)

JET BLAST

by RICH URAVITCH

THIS MONTH I'D like to show you what's going on with our neighbors in the Great White North...so take off, you hosers. Bobby Zieger from Austin, Texas, provided some photos he received from Jeff Ross* of Weston, Ontario. As you can see, these guys take ducted-fans rather seriously—guess they've got long Canadian winters to build like this, but *three* Jet Models Products* F-4 Phantoms? The F/A-18 Hornet looks real good and tips the scales at 22 pounds. It uses a pair of Byrojets with Rossi 81s. One of the photos shows a glass fuselage so I'm assuming molds are available—could a kit be forthcoming? This group has also done a smaller F/A-18 at 16.5 pounds with two Jet Hangar Hobbies Turbaxes and K&B 7.5s.

One airplane I haven't seen for some time is the Me-262 from the AirFlair kit. This was a limited production item which was formerly manufactured by Tom Cook. The Canadians have got it all sorted out and report it flies very well with its twin Dynamax/Rossi .65 power packages hauling its 19 pounds around. I'm not sure whether or not a kit is planned, but if you're interested, I'd suggest you contact Jeff directly for more information.

Moving geographically southwest to warmer climes, I've also received photos from Leonard Van Zanten, prolific designer, builder, and innovator, of his latest additions to the Jet Age Model Aircraft* line. The newest kit is the Grumman EA-6B Prowler. All of these aircraft are designed for his "S" series

Jeff Ross of Weston, Ontario, built the Me-262 and F-18 as part of his stable of jet aircraft.

Van Zanten's fabulous Tomcat is 1/7-scale.

Ziroli F-15 Eagle for RK-20 or RK-740.

fans, which are available in various sizes to suit the application. The F-14 is 1/7-scale which produces a model of almost 9 feet in both length and span (wings extended). This hummer weighs 32 pounds, and according to Mr. Van Zanten, "is a dream to handle in flight—very stable and responsive." It's powered by two 6-inch diameter "S" fans driven by Rossi 81s. For you guys who haven't yet gotten to the F-14 in the picture, the reason is probably the lovely Senia Wesner from Riverside, California.

At nearly the opposite end of the size scale and certainly the opposite end of the country, I recently paid a visit to "Skunk Works East," better known as Nick Ziroli Models*, to see what he's been up to lately. Well, he's been doing lots. What interested me the most comes hot on the heels of his very successful SAAB Viggen and F-4 Phantom designs for the RK-20 or RK-740—an F-15 Eagle. This all-wood model takes the same design approach as its predecessors—simplicity! It uses a single fan unit with a single tailpipe (thrust tube) which is cleverly designed to *appear* as two! It's shaping up well and if it flies at all like the F-4, it should be another winner. I'll provide a flight report as soon as it happens. If you can't wait, $10 to Nick will get you your very own set of plans.

News I'll Be Following Up On...

I hear that Hobby Lobby* has a kit (sporty scale) of an all wood British Folland Gnat that they will be marketing. This is an airplane that the Red Arrows aerobatic team flew before they got their current H.S. Hawks. I don't have a lot of information yet, but the fact that it's an all-wood ducted-fan kit gives us one more than we had.

Bob Kress* (RK series fans) has redesigned the mount system for the RK-740 which is, no doubt, disappointing to those of us who toiled with our Dremels making a 2-inch wide O.S. engine fit a 1 7/8-inch mount. For those of you who missed it, you didn't! The new arrangement is a cup-type affair which picks up crankcase mount points.

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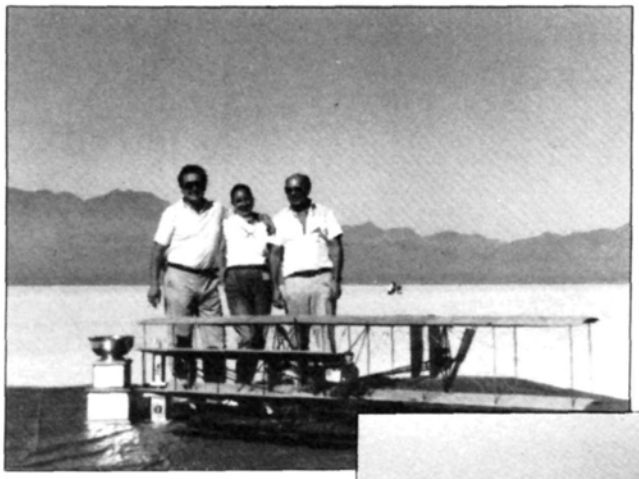
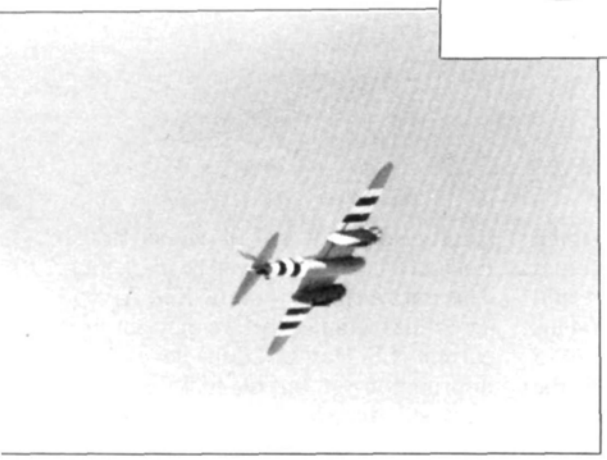
S3A Viking and EA-6-B Prowler are new additions to Jet Age Model Aircraft line.

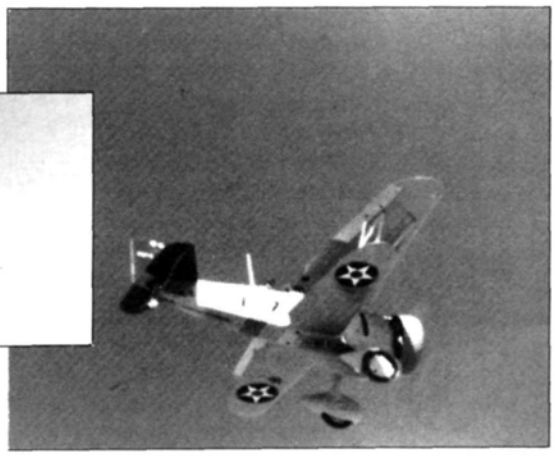


Vogelsang and crew posed with Best of Show masterpiece Wright Flyer.

Right: Bud Atkinson had a fine OS-2 Kingfisher in Navy colors. Below: George Harlan's Mosquito won Best Scale Aircraft award and flew just great.



Below: Best Military Aircraft award went to Noel Hess with his beautiful F11C-2 powered by Kioritz. Below right: Vogelsang and crew prepare for a scale ramp takeoff with the Wright Flyer.



(Continued from page 41)

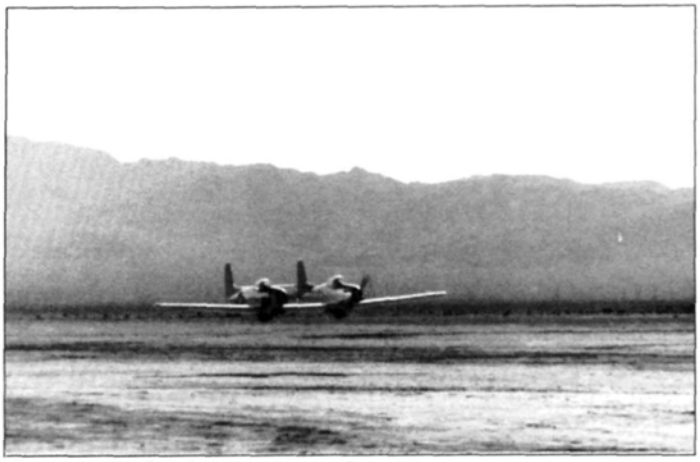
well-known, but seldom-modeled, airplanes. His deHavilland Mosquito put on an impressive demonstration at the static tables and in the air. George is another model builder whose skills are obvious when his work is closely inspected. He always has some item or other (and often several) which "dress up" his static display. The loaded bomb dolly pulled up next to the Mossie added a touch of realism which made many heads turn.

George Harlan's Mosquito had been flown only once prior to coming to Las Vegas, but in the hands of John Elliot, it performed very well and fully earned the trophy for Best in Scale.

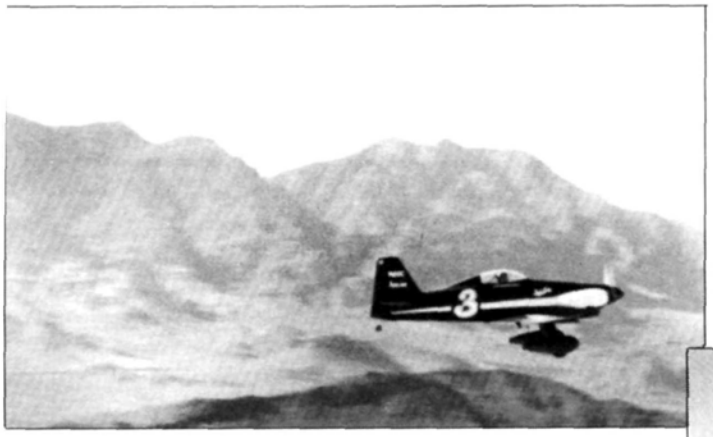
Forest Edwards' Fleet Biplane, powered with his own hand-built radial engine, is as close to a work of art as you'll find in a model. The engine is a jewel and Forest continues to improve the engine as he uses it. He was also one of the three recipients of the Waldo Pepper Award for his contributions to large models, along with Harry Apoian and Addie Naccarato.

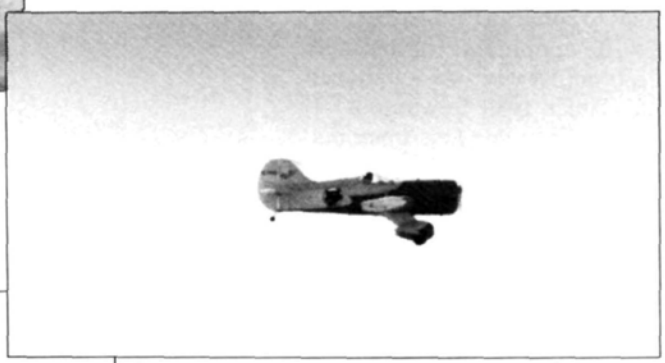
An auction was hosted by QSAA on that first evening with many bargains to be found. A Fly Baby, complete with Quadra engine and Futaba radio, went for just over $300. The evening ended with a pilot's meeting in preparation for the start of flying Friday morning.

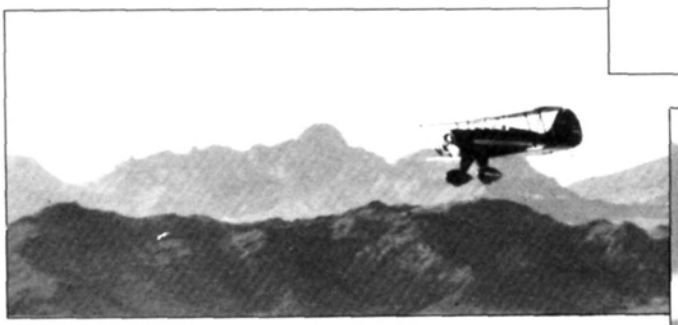
Friday, Saturday, and Sunday were spent on the dry lake bed watching many of these fine models perform. In the past, winds have raised havoc on the lake bed, with dust storms coating everything with fine alkali dust. This year, the weather was benign with no wind of any consequence, clear skies, and high temperatures. Frequency control at such an event can be a real headache, but QSAA and their assisting organizations had things well under control. The ready area and the flight line were in constant

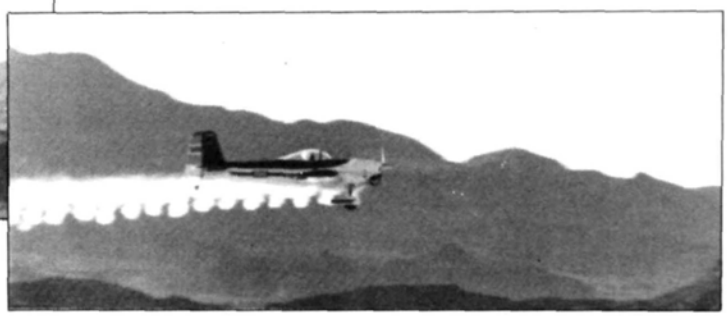


Cosmic Wind, Twin Mustang, and Gee Bee shared the Nevada sky for two days.





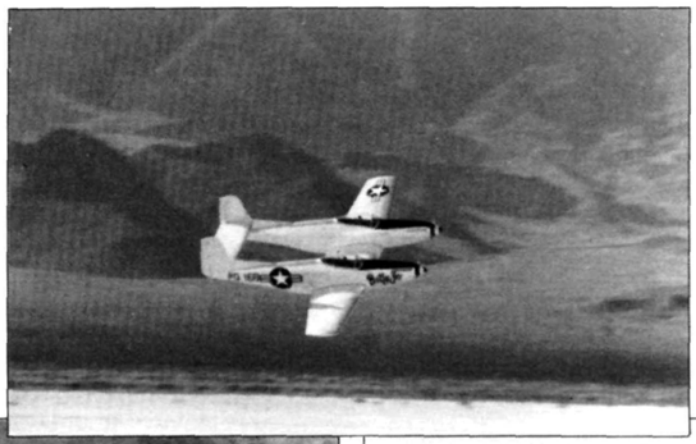




contact by CB radio, making for an orderly and well-controlled flying session.

Mel Barber of South Africa brought his Sikorsky S-39 modeled after one used in Africa by Martin and Osa Johnson in the '20s and '30s to explore the Dark Continent and to gather animal specimens for zoos and museums. Unfortunately, Mel's model had ignition problems and was unable to fly. Always in good humor, he joked about travelling halfway around the world to taxi his airplane.

(Continued on page 82)



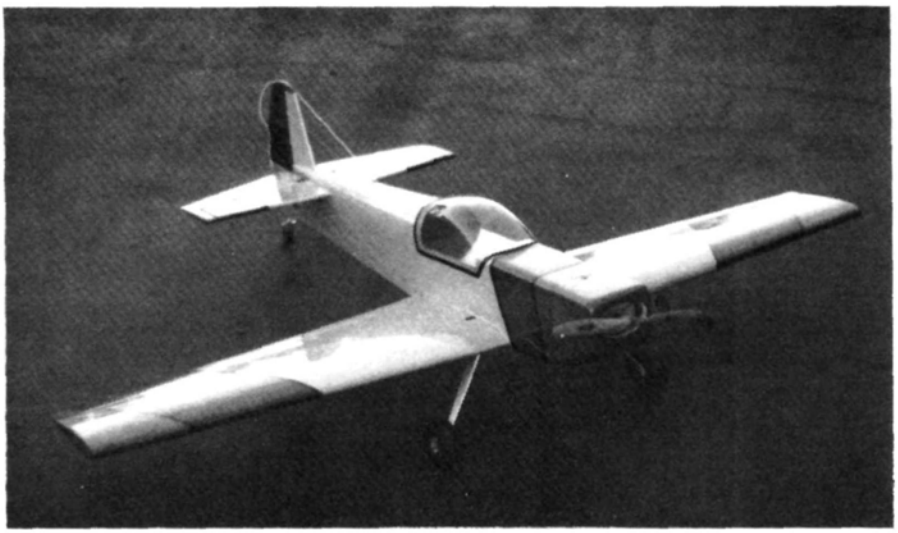
These photos are examples of the great flying action that goes on at a QSAA rally.

WATTS UP?

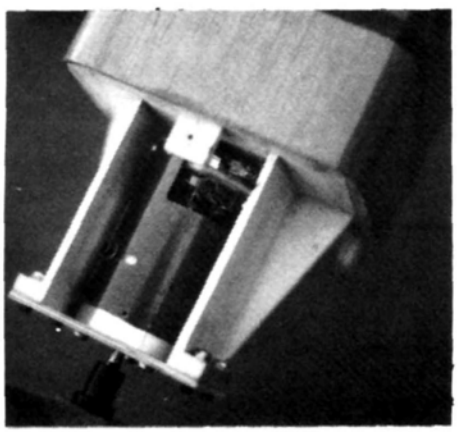
by BOB SLIFF

EACH MONTH someone I know seems to come up with an exciting new development for electric flight. This month it's Terry McFarlane, whose Old Timer 1938 Powerhouse I featured some time ago. This time he's done a "new time" model. He has taken the Model Tech ARF kit of the CAP 21 from World Engines* and made the .40-powered gassie into an electric by powering it with a Keller 50-24 on 18 Sanyo cells. He found it easy to convert (see the unique and clean motor mount pictured), and it came out weighing about 6.5 pounds. He thought that was a bit heavy and that he could have saved a little weight through some surgery.

Even so, he felt it was worth a try, and on the first time out, I accompanied him to the Costa Mesa (silent) flying site. I helped him carry the model out and place it on the ground, into the wind, toward an "instant altitude" bluff. Terry turned on his trusty Futaba PCM, flipped on the motor arming switch, and stood back. Standing there cool and calm, he advanced the throttle stick until the motor switched on. With me holding my breath, it rolled forward, and in about 25 to 30 feet was in the air. It flew out, and in about 25 seconds had reached cruising altitude. From there for about 4½ minutes it cruised about smoothly, punctuated with some crisp rolls both ways. A couple of loops were followed by a high-speed low pass and a quick return to cruise altitude. After a bit more of this, the battery pack reached exhaustion, and Terry glided it in to a very smooth touchdown and roll-out. There was still a little left in the battery, so he taxiied the plane up to his feet, where it stopped, ready for a recharge.



McFarlane's Model Tech CAP 21 on electric is a smooth and steady flyer. Uses a Keller 50-24 but will do equally well with an Astro 40 Cobalt.



Detail shot of mounting an electric motor in Model Tech CAP 21. Cowl covers everything.

To say the least, I was impressed. This Model Tech CAP 21 is a very fine model for electric power. I would highly recommend it to any of you who want exciting performance with no noise or goo, not to mention that a minimum of work is required in order to get it ready. While Terry used a Keller 50-24 for power, an equally good and much more readily available power system is the Astro* 40 Cobalt direct drive system.

Letters

I received a letter from Bob Owens of Tujunga, California, who offers a correction to an error:

"I just got around to reading your column in the March '85 issue concerning 'charging your flying battery pack.' It contained some good information on nickel-cadmium (sealed cell) batteries. However, twice you mentioned 'acid.' Once it was stated 'great spitting of acid' and another time 'leaking acid all over.' I just can't let this go without a challenge.

"Firstly, the electrolyte for nickel-cadmium batteries is potassium hydroxide diluted to about 20%, which has the opposite pH of acid. It's no matter from a safety standpoint, since either can be hazardous to your health.

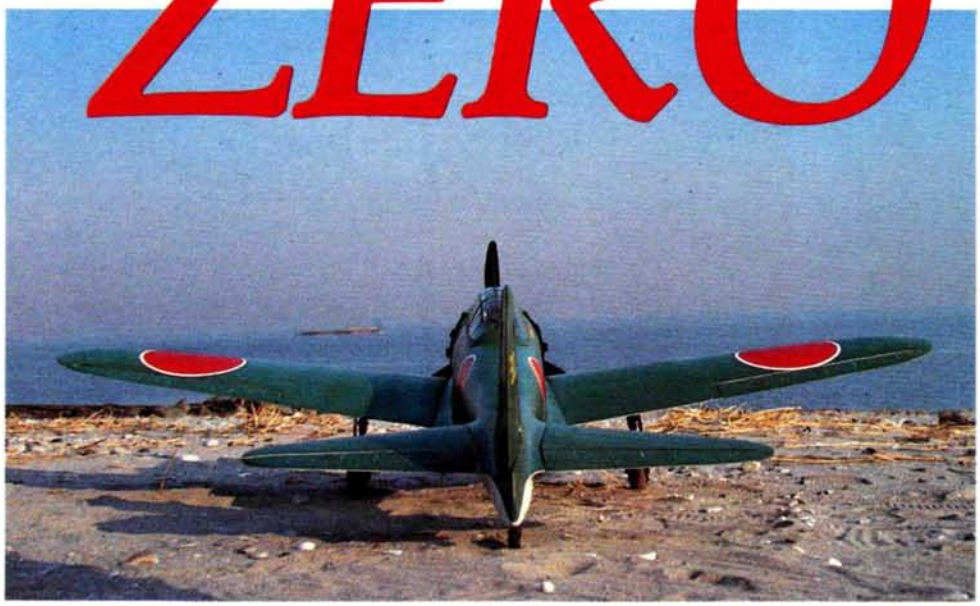
"Secondly, it isn't likely that when the cells 'split their sides' (or worse, explode, which happened to mine years ago when I mis-connected the aligator clips), there's any evidence of spilled electrolyte.

"In my professional occupation I had the fortune of working with a large manufacturer of nickel-cadmium batteries. A tour of the production line of the sealed-cell batteries was most inform-

(Continued on page 121)

Byron Originals

ZERO



by ART SCHROEDER

A nimble ¼-scale version of the Samurai legend.

IN 1937, Jiro Horikoshi designed, to specifications of the Japanese Air Force, an airplane that was to become a most formidible weapon in the early days of WW II. This was, of course, the Mitsubishi A6M Zero-Sen.

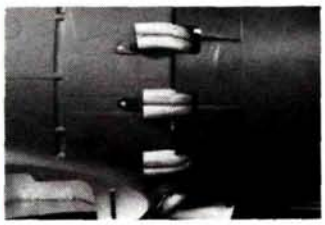
Initially, the Zero met all expectations due to its very light weight, design,

For realism, a pilot is essential.

impressive maneuverability, and expertise of its pilots—indeed, it seemed nearly invincible. But, as weight went up with more powerful engines, strengthening, increased armament, and armorplate, the airplane was no longer able to maintain superiority over newer, faster and more powerful Allied aircraft. The fighter was used through the war as a basic, land-based weapon, a ship-board fighter, a Kamikaze raider, a rocket platform, a float-equipped airplane, and a trainer—there were few WW II aircraft that filled so many roles or went through so many modifications to meet varying needs. In all, nearly 11,000 Zeros of all types were built by Mitsubishi and Nakajima. In the final analysis, increasing weight and power problems—as well as the loss of Japan's top pilots—diminished the fighter's effectiveness and it became one more symbol of Japan's ultimate defeat.

color photos by Louis V. DeFrancesco

But, little can be taken away from the Zero-Sen; it was a lean, mean fighting machine. To some, it represented one of the most beautiful and effective of WW II fighters. There



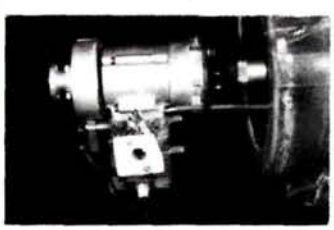
It's the little things that count such as simulated exhaust stacks.

was nothing superfluous about the Zero; every line and every component had a purpose. It remains today as a perfect example of "form follows function"! It's a well-designed aircraft with a distinctive look.

All of the Zero's lines and flight capability are apparent in Byron Originals'* kit in 1/5-scale. When completed, the airplane looks great and matches its appearance with airborne performance second to none.

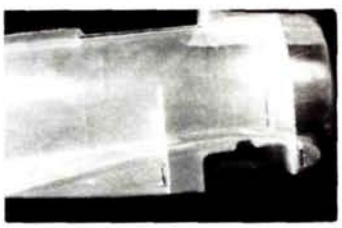
Byron's "Warbird" series is well-known to all modelers and their P-51 and P-47 are seen at virtually every giant-scale affair. But something was missing—there simply wasn't an "enemy" to "fight" with the Mustang, Jug and, most recently, the Corsair. Kitting a Zero was, therefore, a natural and one wonders how far behind an Me-109 can be for the Iowa-based company.

THE KIT. The Byron Zero follows this innovative firm's now famous practice in that it's a complete kit



Q-82 powerplant setup.

(only engine and finishing materials are not included) in a composite structure: fiberglass fuselage, molded-foam flying surfaces, a variety of die-cut plywood pieces for formers and hinge covers, aluminum wing and stab spars, a variety of metal fittings, retract landing gear of molded nylon and metal, and the usual nuts, bolts, clevises, ball links, and hinges. Except for aileron, elevator, and rudder trailing edges, there is no balsa at all in this kit. And,



Wheel wells are beautifully molded into fuselage sides.

it's not needed since the materials used fulfill their intended purpose so beautifully. Byron kits truly have a "space-age" approach to model airplanes.

At first glance you realize the two large boxes contain a lot of "stuff," but the completed Zero's size doesn't strike home since the fuselage, wings, and stabilizer are two-piece affairs and the canopy and cowl are separate items. It

(Continued on page 59)

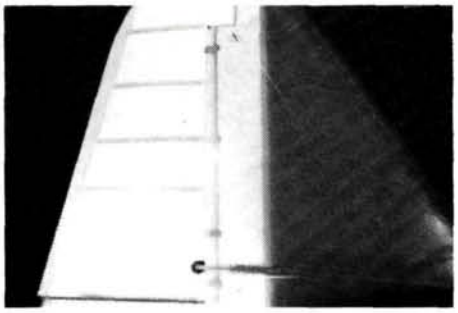
Ingenious Byron controlled actuating mechanism.

black & white photos courtesy of Byron Originals

ZERO

(Continued from page 57)

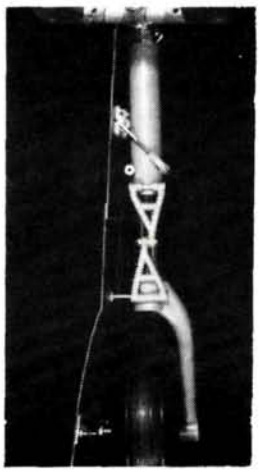
isn't until everything is put together that you realize that this is a big machine with an 88-inch span, a 75-inch length, 1,350 square inches of area and (in the case of the review model), an overall weight of 27 pounds. Completed on my bench, the Zero dominated my workshop. It's the biggest airframe that has been in there; as big and heavy as I personally want. Let me hasten to add that the plug-in wing and stab make the Zero practical; I can fit it into my Toyota Starlet hatchback with all field equipment and room to spare.

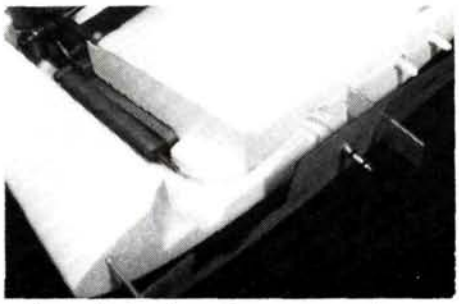


Rudder has open rib section for scale effect.

Included in the kit are an excellent instruction booklet and a series of drawings on large sheets of paper that really ease assembly. Frankly, I can't fault the instructions and I followed them to the letter to a very satisfying conclusion.

I use the word "assembly" since there is little building on the Zero—at least building in its usual sense. Rather, a Byron warbird is composed of a series of enjoyable steps that connect and lead to a finished airframe. In fact, one of the charms of a Byron kit is that it ideally fits usual spare-time hours. You can start a step, finish it, and pack it in for the night; each step is a task unto itself.





Plywood wing butt plate supports wing braces and quick-disconnect linkages.

However, don't ever get the idea that a Byron warbird is, in any way, an ARF. There is a lot of work to do in those two boxes. Enjoyable as it is, plan on several months of spare-time activity. There's so much to be done that you can't help but feel very satisfied upon completion—I certainly did! For the record, every part in my Byron Zero fitted perfectly—a reasonably adept modeler will have no problems if instructions are carefully followed.

CONSTRUCTION. I did find as I assembled my Zero some things that might prove helpful:

Cut ply parts—hinge covers and wheel well reinforcements—with a single-edge razor blade and a straightedge. This will give a much cleaner edge and a better fit.

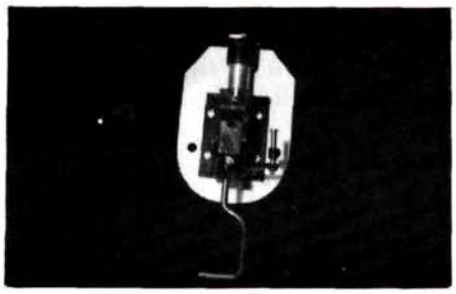
When working on foam parts, keep your bench clean—foam parts do dent easily. Fortunately DAP or any acrylic spackling removes those bad spots.

Rough-up the aluminum torque rod before finally epoxying them in place. Wherever metal is glued in place, roughen its surface.

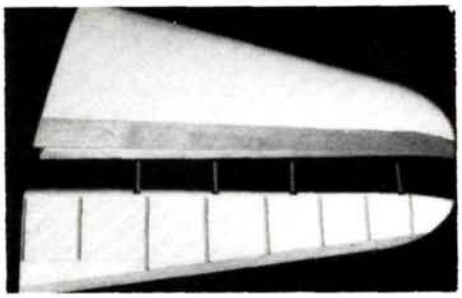
The former that holds the front wing spar extrusion requires patience and a little trimming to get it in place. Be sure to fiberglass all formers in place on both sides.

The inner door cylinder must be offset from center in its designated place to permit installation of hoses.

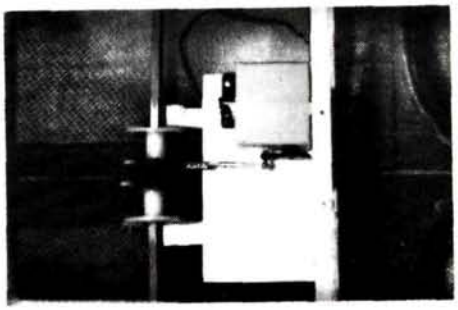
I installed the fuel tank with Velcro straps. I initially used rubber bands as shown, but the bands' tension caused a slight dimple in the fuselage side. The Velcro held my tank securely without loading the light fiberglass structure.



Left: Super scale main gear is available from Byron. Above: Tailwheel is retractable and steerable.



Horizontal stab is a plug-in affair for convenient transportation even in small cars.



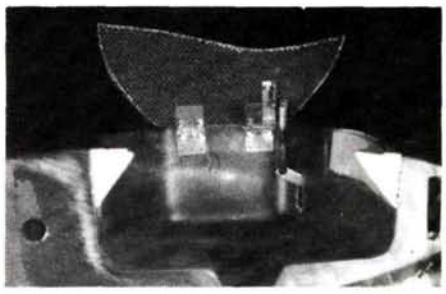
Flap servo drives the two flap sections. Square rods plug into nylon actuators.

Install the false ribs on elevator, rudder, and aileron with Pacer's* Z-Foam Primer and Zap cyanoacrylate glue. Epoxy, no matter how quick it may cure, will drive you crazy holding pieces in place. Z-FP permits instant installation; in fact, all hinge covers could be installed in this way to speed things up.

You may have to thin the leading edges of movable surfaces for a clean fit inside the hinge covers; allow a bit for covering.

Loctite all nuts and bolts when they are finally set in place (material is supplied in the kit). Think about vibration and what it can do and be sure anything buried can't come loose.

(Continued on page 122)



Gear doors are pneumatically operated in sequential arrangement with master cylinder.

RADIO CONTROL NEWS

by ART SCHROEDER

IT'S HARD TO BELIEVE, but the DC-3 has just turned the corner on its golden anniversary. A half century of service was recognized by *Nova,* a documentary program on public television with the film, "The Plane That Changed the World—The Story of the DC-3." All the accolades heaped upon this venerable airliner in that program were well deserved and I hope you all had a chance to view it. If not, a video tape of the program will be available—try your local public TV outlet. One thing is certain, any aviation buff with a soft spot for the DC-3 will surely find the *Nova* presentation worth viewing.

The DC-3 is, for those who don't know, an airplane that made today's commercial aviation possible. It's the ancestor of the well-known DC-9 and DC-10 as manufactured by the McDonnel Douglas Corporation. Back in 1936, Donald Douglas and his team designed an airliner to meet the needs of a newborn travel industry. This airplane did its job well as proved by today's vast commercial airline networks; indeed, the DC-3 "changed the world." Its role did not end as a "people mover" in peace time—it became a "soldier mover" in WW II as the C-47 and a paratrooper aircraft. The "Gooney Bird" served as a glider tow and later, in Vietnam, became "Puff, the Magic Dragon," a high-firepower, tactical attack machine. Variety has been the DC-3's history; it has filled so many roles.

There are still over 1,000 DC-3s in daily service as airliners, executive aircraft, cargo carriers, and military. One DC-3, still flying regularly in New England, has over 88,000 hours of operation on its clock (that equates to over 10 years of constant, 'round-the-clock operation).

As respected as the DC-3 is, one doesn't often see it modeled. That's strange, since it really makes a superb subject for a twin-engine model airplane of any size. Perhaps the rarity of DC-3 projects stems from concern over any "twin" airplane. However, there is a plan that can get you to recognize the DC-3's anniversary. The plan is by Paris White and it appeared in the June 1971 issue of *M.A.N.*; it's listed as plan #75 in the Plans Directory and it sells for $10.50. The design is "right on" in scale and would be ideal for today's four-cycle .60 engines, although originally designed for twin .50 two-cycles. This is one version that is so stable it can handle even "ham-fisted" flying—with one engine out. Believe me, I saw the original fly! You might want to give it a try. It would be super scaled up by 10% with scale retracts and small chainsaw engines.

There is also a fine DC-3 (C-47) in kit form from Royal Products. This bird spans 83 inches and is powered by .40-.60 engines. As always from Royal, the kit is superb.

Celebrate the DC-3's 50 years of service—build one!

Einar Pall Einarsson of Iceland got a set of Jim Follins plans and came up with this fantastic model of the PT-19 Cornell.

Travel is Great

Model aviation is a fascinating hobby with its elements of science, craft, sport, and competition. But even more fascinating are the members of this worldwide fraternity; all people with a dedication to this hobby/sport. I've never met a modeler who was not a pleasure to be with, who wasn't interesting to talk to, and who didn't have a story worth telling. Perhaps that feeling comes from our common interest but, more likely, it comes from the fact that modeling draws interesting people. I believe this is so and my opportunities to travel all over America and the world bear this out.

Take Einar Pall Einarsson of Iceland, a truly dedicated modeler I met a few years ago on a trip to that northern bit of land in the Atlantic. Einar is a TV cameraman by profession, a photographer, and a fine, dedicated modeler and flier. Indeed, Einar could be a successful international competitor in

both pattern and scale but opportunities for competition to really hone his skills to that level are limited in Iceland. Recently, giant scale has captured the Icelander's interest and the results of his efforts can be seen in the photos. His two most recent projects are a ¼-scale PT-19 powered by a Kioritz engine and a scratch-built Super-Fli original of Kraft's aerobatic machine powered by a King 60 engine. Both are apparently fine-flying aircraft and that is to be expected since "Pali" exhibits the same attention to detail, construction, trimming, and generally good modeling practice I've seen in successful modelers everywhere.

This with a king-size handicap just

Another example of Einar's ability is this beautiful Super Fli above.

try modeling in Iceland (thousands of miles from the recognized centers of our hobby/sport) where everything has to be shipped to the island. Costs are understandably high and the wait must be agonizing. There is a fine hobby shop in Reykjavik (the capital city), but most Americans would go into cardiac arrest at the prices that must be paid due to shipping costs and a limited sales level. Modeling in Iceland is largely an individual effort—if you want to build models you find a way! Sometime in America we ought to thank someone for a distribution/manufacturing/import network that makes modeling such an enjoyable way to spend our spare hours.

All problems aside, when you do travel, somehow find time to contact the local modelers. Believe me, this will give you a great deal of pleasure, knowledge, and understanding.

(Continued on page 108)

The Golden Age of R/C

by HAL deBOLT

THE FEATURED model this month is the Live Wire, a design which led to a long line of kits that served the needs of the exploding R/C sport. The lineage evolved into the Live Wire Trainer, the Cruiser, the Kitten, the Rebel, the Champion, the Sonic Cruiser, and the Yankee. When a small version of the Live Wire design proved successful, it was nicknamed "Junior." In kit form it was labeled "Trainer." Logically or not, the original design got "Senior" added to the title.

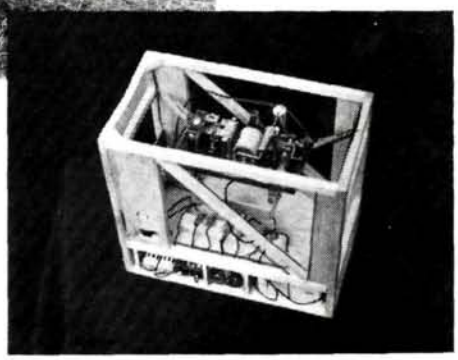
Offspring of the Live Wire design led to the first realistic inverted aerobatics. In fact, the influence of this basic design still continues today.

To understand the "whys" of this design you have to appreciate the atmosphere of the period. Control line was supreme in modeling, on a level with the radio control of today. R/C was just ready to take off with the opening of the Citizens Band frequency. Control line models had already progressed to a high plateau in design, structural simplicity, and flyability. C/L models were quick to build and very rugged, and modelers were accustomed to being able to fly them in adverse weather; they no longer waited for ideal winds. Radio control designs still had complex structures which damaged easily and did not do well even in moderate winds. It was logical to expect that the new R/Cers coming from the C/L ranks would want similar conditions.

I was involved in the production of C/L kits with dmeco Models. dmeco felt that R/C would be the modeling wave of the future. To produce rapid growth, kits had to suit the desires of the incoming C/L people, which indicated that a sharp break from traditional R/C models was needed to suit the expectations of C/Lers.

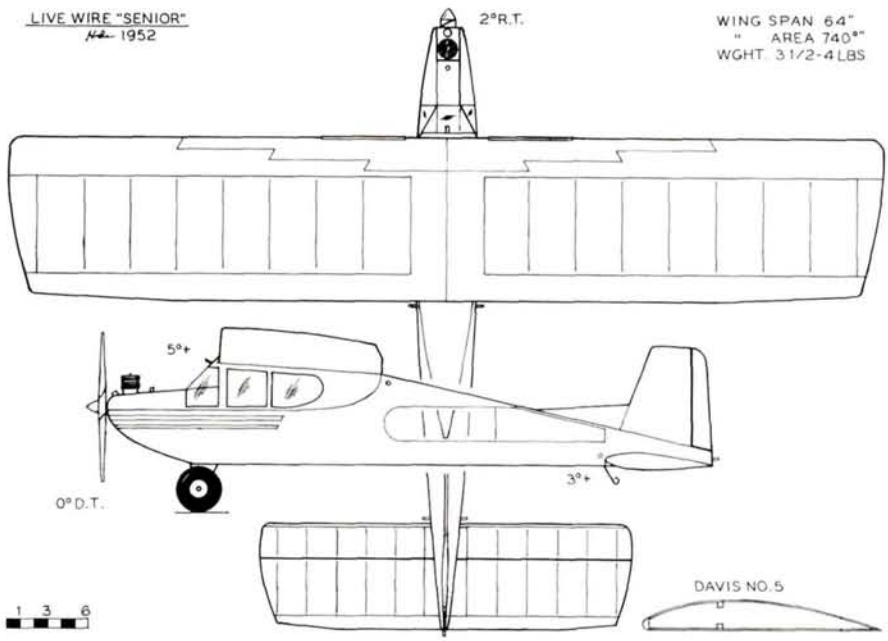
With my Rudder Bug experience I found that there was much to be desired in performance, structure, and simplicity. My friend Bill Winter, who had considerable R/C experience, and I collaborated

deBolt's Live Wire Senior, 1952 vintage, was a trendsetter. Box below is removable carriage that housed receiver in suspension by use of rubber bands for shock dampening.



on the first Live Wire. Many long-distance calls and letters were used to establish the parameters for what was to be. Bill, then editor of *M.A.N.*, also felt that R/C would be the future of modeling. It seems silly today, but then there were few industry leaders who would agree. C/L was supreme!

The collaboration resulted in a 14-point checklist of features that the ideal R/C design should have. Fortunately, aerobatics and other niceties of today's flying didn't have to be considered. The goal was a simply-assembled structure; one that was rugged enough to stand the abuse of uncontrolled "bounces" off the turf, utility for radio service, and the ability to fly in adverse weather and return to the launch point. Control



would be rudder only. You might think that sounds simple, but back then these were incredible goals to accomplish with one design.

The actual 14 points are dim in my memory today but the prominent desires are clear. For performance the design had conflicting goals besides the ability to fly by radio. Number one on the list was wind penetration. To fly in moderate winds you had to be able to fly upwind to get back to the launch point. In contrast, penetration is easiest with a fast flying speed, but you needed a slower speed to reduce damage when you had an earthly encounter. The basic Rudder Bug philosophy showed how to get flat turning ability and other flight necessities. Walt Good had provided that knowledge. Otherwise, the design should be easily hand-launched and land softly, as flying fields were undeveloped and there were no runways.

The model size and power were dictated by the need to carry heavy R/C weights at relatively low speeds. This was accomplished by having the wing do the work instead of the engine. The Live Wire was relatively large with 750 square inches of wing area using only a .19 engine.

We got the needed lift from the Davis airfoil set at the ideal 5° incidence, as had been proven by Frank Zaic. A thick, symmetrical stabilizer was also used, set at a lifting angle. With both the wing and the stabilizer lifting, it was thought that the model could have a "flat" flight attitude and still gain altitude by rising more vertically instead of the normal high-drag, nose-high method. Thus, penetration could be much better. In addition, this arrangement should negate most of the "ballooning" tendencies seen when turning into the wind. All these requirements were because of the lack of elevator to trim the flight path.

Another diversion from the norm was reduced dihedral. I had to use a lot less on my Bug to make it fly satisfactorily, so it was further reduced on the Live Wire. Otherwise, aerodynamically, we followed the Rudder Bug philosophy, but the changes did provide dramatic performance.

Bill and I felt that utility was paramount for the newcomer to R/C, so the Live Wire fuselage was designed around a removable R/C unit, actually a simple box with all the R/C components inside. Because it was interchangeable between models, it was even more useful. Later, some R/C manufacturers grabbed the idea and packaged R/C systems as single units, affectionately known as "bricks" from their size and weight.

A major step forward was the Live Wire structure. Instead of the usual sticks and silk, C/L experience was adapted to this R/C design. We used stressed skin, with sheet balsa replacing the normal longerons and trusses. The sheeted fuselage and wing reduced assembly time nicely, while providing the desired ruggedness.

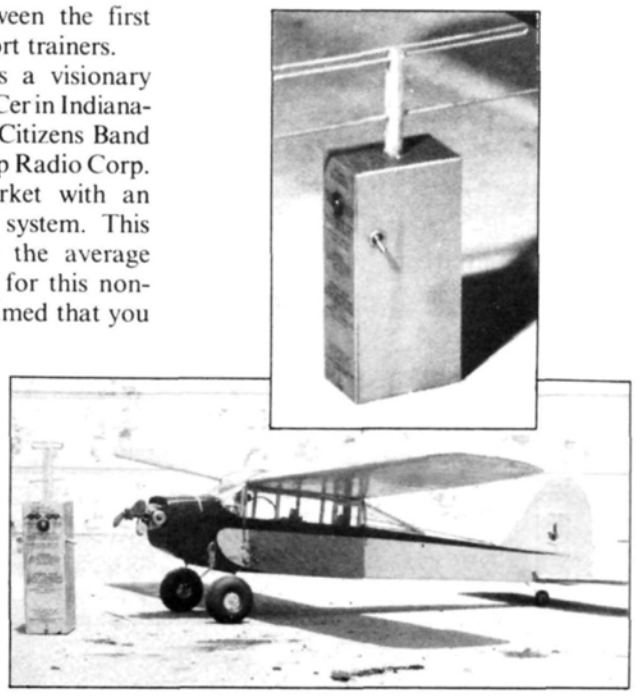
Another useful design feature was a rubber band-attached aluminum landing gear. Rudder-only radio malfunctions often resulted in a spiral descent to the ground. Permanently attached wire-style gear were hard to fabricate and usually tore out a lot of the structure on impact. The aluminum gear simply flew off, allowing the fuselage to slide along the ground. Usually only some new bands and a prop were needed to get the model back in the air. You won't see much structural difference between the first Live Wire and today's sport trainers.

Vernon MacNabb was a visionary electronic engineer and R/Cer in Indianapolis, Indiana. When the Citizens Band opened up, his Citizen-Ship Radio Corp. was quickly on the market with an integrated single-channel system. This was a positive step for the average modeler. The advertising for this non-electronic type system claimed that you could just plug in the batteries and go flying, quite like today. There was no tuning, no adjusting, and no diddling. It was so different from the 27.255 MHz systems. The difference was the 465 MHz frequency which allowed stable circuits and required a very short antenna that was a dipole with a reflector on the small hand-held transmitter. Better yet, the transmitter needed only one small battery.

The receiver was on one side of a printed circuit type board with its short antenna hanging from the bottom of it in the form of a rectangular aluminum strip. You slung the receiver in the model with four rubber bands to isolate the sensitive relay from vibration. The CS-465 used long-life "hard" tubes and batteries were at a minimum. In turn, the relay operated a standard Bonner escapement to complete the package.

What I never did understand was that, with the success of the CS-465, why was Babcock the only other manufacturer to produce a 465 system?

George Swank and I built two prototype Live Wire Seniors equipped with CS-465 radios and rudder-only control, and powered with K&B .19 engines. Again, test-gliding from a height was used as a pre-flight check, they looked



Early radio designs were pioneered by Citizen-Ship and Babcock.

flyable. Once more my initial powered flight was an experience. I was so engrossed in the early morning flight that I forgot about the fuel supply and the engine quit some distance away. Would you believe that the forced landing was on a nearly deserted highway but a lonely car still came along and ran over the tail?

Subsequent flights with the models made both George and I very happy; even the radios seemed flawless. We were anxious to compare what we had with other R/C models of the time. Late in the season, the only R/C event left was the Canadian Nationals, so we went to observe. We were shocked to find that with a moderate breeze all flying was grounded. George and I thought that with no action we could at least sport-fly, but we found that to do so we had to enter the Nats! You can imagine our surprise when these two R/C beginners took first and second at the Nationals! George did better by getting takeoff points from the rough field.

We were inspired. Later that winter we attended the King Orange event in Florida to repeat our success under better conditions. We were assured that the new design was sound and that the 465 radio was reliable. Actually we logged about 150 flights with the combination before encountering the first problem. One cold winter day the escapement rubber froze in flight. We wondered why the whole project had to depend on a 2-cent piece of rubber. The answer to that is another development worthy of a later discussion.

Dr. Austin Hill of Haworth, New Jersey, wrote telling of his latest OT R/C exploits. His first R/C models were a Live Wire Kitten and a Rebel, offspring of the Senior design. For several years he has been collecting OT R/C kits and now has a good supply. I've heard of others doing the same, and it seems that OT kits are often a good buy as they're much less expensive than modern kits. Many have excellent performance characteristics and the added value of a nostalgic design.

Dr. Hill was quite impressed by the performance of his newly-built Live Wire Custom bipe. He found that it handled as easily as a trainer, yet was maneuverable too. The first flight was one that we could all appreciate, ending with a perfect three-point landing.

Austin's OT stable also includes a Custom Privateer that is big enough to impress even the giant-scale types. We can imagine the pleasure this one is, flying off water with modern equipment.

Austin also included a Kodacolor print of his Custom, showing a beautifully-built model, but Kodacolor doesn't reproduce well, so when you can, simple, clear black and white prints will allow all of us to see your pride and joy.

It's also interesting to know the type of equipment you're using with your OT model. The original Custom was powered with a K&B .35, using a Bramco throttle. The radio was Bramco five-channel reeds providing rudder, elevator, and engine control. Actuators were Multi-Servos by dmeco. Yes, the Custom would do pretty rolls without ailerons, something not often seen these days.

Let me remind you of the "first in R/C contest." I'd like to know who had the first R/C model. Maybe it was unpowered, a glider perhaps? If you know, let me know. Also remember that this is your OT R/C column. We'd all like to know what you're doing.

Keep the nose down when launching.

Hal "Pappy" deBolt, c/o *Model Airplane News*, 632 Danbury Rd., Wilton, CT 06897. ■

PATTERN MATTERS

by MIKE LEE

THERE'S AN interesting point in the ever-burning argument over what type of aircraft seems the most appropriate for use in FAI Turnaround. For those of us taking polls, it seems that the semi-scale types of aircraft are *not* taking over the pattern scene as predicted by some. As I've noted several times in this column, our beloved fire-breathing pattern birds that we've been flying for the past decade are quite satisfactory for the job.

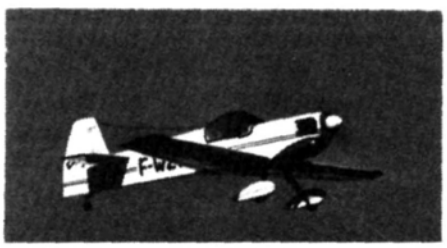
Take, for example, the Nationals in Massachusetts last year. The most common ship in FAI was the sleek pattern monster. A few semi-scales were around and a significant number of slightly enlarged pattern birds were seen, but the normal pattern birds were the most popular.

As another example, the Masters Tournament in Louisiana saw the standard pattern birds all over the place. True, Steve Rojecki, who placed fourth, and Chip Hyde in fifth, flew semi-scale ships, but they were exceptions and were no doubt outnumbered by the fire-breathers.

The final true example puts us in the Netherlands at the World Championships—pattern ships galore! As a matter of fact, it was said that the U.S. team's aircraft were among the slowest aircraft at the meet. It's notable that the team members impressed the judging staff with their closeness of flying and strict adherence to the maneuver box, while pilots of all other teams almost totally disregarded the box and flew wide-open maneuvers. Of particular note was the Japanese team. It was jokingly rumored that the judges were going to be issued binoculars to judge the Turnarounds of the pilots.

The point here is simple; don't throw away or mothball your present pattern bird when transitioning to the Turnaround pattern. There's no smoother, more graceful, more capable aircraft in the skies today than the piped, fire-breathing monster of a bird we call the pattern ship. Use that ship for the FAI pattern and see what I'm talking about. And if anyone has got a semi-scale ship that can match a pattern bird in the hands of the average pilot, then step forward with it! It might make a great construction article.

Heather and Steve Ellison show their Illusion that Steve flies in Turnaround.



Mike Lee's CAP 21 was built for Turnaround, but he feels pattern ships are the way to go.

In the Right Place at the Right Time

Getting your new pattern bird in the right place for performing maneuvers in front of the judge is important. Allow the judges to see the most advantageous view of the maneuvers. Placement of the maneuvers has to be such that when a judge views our execution, we show him the real beauty of the maneuver, rather than inadvertantly hiding it. Thus, we can accomplish scoring more points and we end up perfecting our technique.

Ivan Kristensen of Canada with his famous Atlanta pattern ship.

Let's talk about the timing of the maneuvers, which has a lot to do with their performance, and getting them centered in front of the judge.

Timing of a maneuver starts with the actual maneuver call. A neophyte pilot is often heard announcing his maneuver just as he begins the execution of it. For example, a common loop. The newcomer will call out, "The Inside Loop is next, now!" Accordingly, his loop is beginning when the word "loop" leaves his mouth. While there is really no downgrade for this, his loop, in the minds of the judges, is actually being judged some 3 seconds earlier. That's because the rule book requires an entry and exit on the maneuver being performed.

According to the book, all maneuvers are required to establish an entry into the maneuver, beginning with aircraft being straight and level (in most cases). This establishes the heading and attitude of the ship prior to actual execution. The period of this straight-and-level flight is about 50 feet, or the equivalent of 2 seconds. Personally, I prefer the 2 seconds because the real truth is that our aircraft are travelling about 160 feet per second, when on the pipe.

Anyhow, you must have a lead-in to the maneuver. This in turn throws your timing back a bit. The pilot must now remember to fly his lead-in upon calling

his maneuver to begin and before actually executing the maneuver. This is to the advantage of the pilot, in that he may now call his maneuver and then have a bit more time to concentrate on the execution. Now the timing sequence for the Inside Loop goes something like, "Inside Loop is next, beginning now!" (one-thousand-one, one-thousand-two, maneuver is executed).

Sounds easy enough, but I did leave something out, the exit. The exit is basically the same as the entry, a straight-and-level portion of flight immediately following the execution of the maneuver.

Chip Hyde with his winning Dalotel 60, built from Hansen kit.

It's a judged portion of the maneuver. Moreover, it can mean the *coup de grace* of a good-looking maneuver which may push that score up even more. Now our maneuver looks like, "Inside Loop is next, beginning now!" (one-thousand-one, one-thousand-two, execution of the maneuver, one-thousand-one, one-thousand-two), "Maneuver complete!"

Notice in this description I added not only a time interval to the end of the maneuver being executed, but I also added the bit, "Maneuver complete." This is a bit of psychological strategy. It seems that the "human nature" side of us wants to hear the beginning and the end of things when they occur. Without saying the maneuver is complete, the judge may have a tendency to continue following your aircraft in flight for quite a ways after the maneuver is completed. Meanwhile, you have terminated the maneuver and might want to wag your wings to loosen up your nerves. The judge watches this and might think this was a mistake and downgrade you accordingly. More experienced pilots might think this a bit of a joke, but why risk it? Most of us have seen it at least once. Keep it from being you.

The timing of the call and the subsequent execution of the maneuver now play a vital part in your pattern performance. You must be able to properly gauge the point where the maneuver will actually be executed, and make the call to the judge accordingly. For those maneuvers that are executed in front of the judge, the call will come sometime when the aircraft is on the pilot's flank. This is assuming your ship is of the normal afterburning gender. Consequently, the call for completing the maneuver will come on the opposite flank at about the same spot. By the same token, maneuvers that are executed slightly to the side of show center are called when the aircraft is close to show center, if not at show center.

It sounds a bit like nitpicking, but this method of calling and executing is the method recommended by the book. And when performing the maneuvers this way, make your calls with confidence and authority. Believe it or not, a judge can detect a nervous voice and might give your execution the evil eye. He feels there might be something to downgrade if the pilot is afraid of performing the maneuver. Call out that maneuver with confidence, like you've been doing it all your life, and the judge will feel confident with you.

Futaba PCM

For the past 8 months, I've been flying the tails off of Futaba's* PCM radio, and I can say it's a superb radio. The transmitter handling is about the smoothest around, and airborne response is excellent.

You may wonder why I would make a statement like that in this column. I'm definitely not doing it for a paid advertisement, but merely to drive home a point. The PCM by Futaba is no doubt one of the premier radios on the market. And it's true that a radio such as the PCM can indeed make you a better pilot. Sure, the radio system still does the same old job it did ten years ago, that being the guidance by radio signals of an airborne model. But now we're looking at how much more accurately it can be done.

For example, a mere ten years ago there was no such thing as dual-rate switches. Pilots had to decide whether to settle for a model that rolled three times in five seconds or a model that rolled faster and required the pilot to hold partial stick. Doesn't sound like much, but if you were good at doing slow rolls, you could settle for three in five seconds. If not, you had to get good at holding the sticks steady for the slow and three rolls, while leisurely flicking the ship out of the maneuvers.

Today, the dual-rate switch allows you to set up the aircraft to do three rolls at the right speed, the slow roll at the right speed, and high-speed rolls at any speed you want! The Futaba PCM, and other premier radios, allow you to custom-set rates, mixing, offset, end points, total throws, and almost anything your heart desires; and at an incredible rate of dependability. Don't forget, us old timers remember that a good day of flying was one when you had enough of the pieces left to rebuild the ship.

The resolution of the modern radios is unbelievable. Older radios would literally jerk their way around with the pulse train of the transmitter. Today the movement is so incredibly precise that the aircraft will tell you every mistake you make on the sticks—and that's what will make you a better pilot.

A better radio will make a liar out of you. You may think you fly well until you get that new radio. Suddenly you find you can't fly for beans! The reason is that the new radio follows every command, every flinch, every nervous move your fingers commit. Consequently, you become aware of it. You pay more attention and devote more concentration to the sticks. You end up being better! And that's what it's all about.

Ron Chidgey's Tarbaby uses R.120 and is larger than your average pattern ship.

Next time you think that a new piece of equipment can't do you much good, think it over. The technology in today's R/C hobby is nothing less than Space Age. For that, I give my personal thanks to the entire hobby industry.

See you at the next pattern meet. 'Til then, we're on the pipe and airborne.

Mike Lee, c/o *Model Airplane News*, 632 Danbury Rd., Wilton, CT 06897.

**The following is the address of the company mentioned in this article:*

Futaba Corporation of America, 555 W. Victoria St., Compton, CA 90220. ■

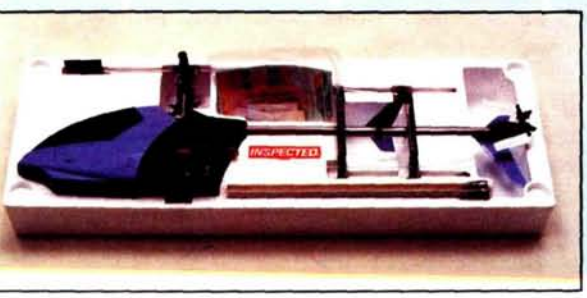
The new GMP-Hirobo Shuttle is a genuine breakthrough in helicopter design.

by GRADY HOWARD

GMP-Hirobo Shuttle

A revolutionary, hot-performing, ready-to-fly chopper!

THE SHUTTLE has landed! No, not the Space Shuttle; GMP-Hirobo's Shuttle. Gorham Model Products* has just received a shipment of Hirobo's new, "ready for takeoff" R/C helicopters. I was fortunate enough to receive one of the first to arrive in the U.S. There are many adjectives to describe the Shuttle, but the best I can think of is "revolutionary." I feel that this ready-built .28-powered R/C helicopter will do more for the helicopter hobby than anything since the R/C helicopter was first introduced in the early 1970s.



THE KIT. GMP-Hirobo has incorporated fiber-filled nylon in the construction of all rotorhead parts, as well as in the frame components. The canopy is not made like most canopies that use vacuum-formed plastic. Hirobo has used injection-molded plastic for a more rigid and detailed canopy. The canopy has tracks molded inside that match a rail on the floor of the helicopter. To install, you simply slide the canopy onto the rail and to the molded latch at the top of the frame for a secure fit.

CONSTRUCTION. All pushrods and linkages are pre-set and even the Z-bends on the rods are ready made. Servo installation is simple, with the servos being mounted under a sliding bar at each end. After hooking up the servos, you slide them fore and aft until the swashplate is level. You then tighten the three screws on each end, and you have installed the servos. You can use four or five servos. The throttle and collective servos are mounted in the same manner. Measurements for degrees of travel are given in the instructions. I'd like to add that the instruction book is very thorough in both English and Japanese. The instructions are complete and even explain what each control function will make the Shuttle do.

The tailboom is made of thin-walled aluminum and houses the tail rotor drive belt. Yes, I said belt. The drive to the tail rotor is via a toothed belt and offers no-slip operation. The rear belt pulley has an idler pulley just in front of it to keep the belt snug against it. The idler pulley has a bearing in it for smooth, no-drag operation. The Shuttle has a total of 15 ball bearings throughout the mechanism, and is a quality-built helicopter.

The main rotor blades are made of hardwood and come painted and ready for installation. As the Shuttle comes out of the box, you only have to put in six bolts to have it sitting there waiting for radio and engine. It requires two bolts for the main blades and four bolts for the landing gear. All bolts are included in the kit.

The engine installation is simple and the fan and starting pulley are mounted with the prop nut. The clutch is then fastened to the pulley with two screws. The top of the clutch has a ball bearing in the center for alignment with the clutch bell. The clutch bell has a shaft in the center of it for the clutch to fit on. The engine is fitted to the engine mount, and this assembly is slid up through the bottom of the side frames and fastened there with four bolts. The entire assembly time was 2 hours and 15 minutes, which included removing my radio from another helicopter. A neat little platform is already installed for your gyro in front of the engine shroud.

FLYING. After charging the radio batteries overnight, I got an early start on testing the Shuttle. After lift-off, the only adjustments that were needed were two clicks on rear cyclic and two clicks on right cyclic. The rotor blades were in perfect track and there was no vibration to indicate any need for balancing the blades. I've now had almost a gallon of fuel through the Shuttle and have found only minor problems.

I had an engine quit at 15 feet in a hover. This resulted in a tailboom

(Continued on page 102)

Big Engine Sho

by DAN SANTICH

Front row, left to right, YS, Super-Tigre, OPS, HP, Webra, HB.

SOMETIMES THINGS just seem to go together right. The proper working relationship with moving parts brings more than a workable solution to a problem. It brings utility. Such was the case with the Ford Model A and the Douglas DC-3. Although neither was the first for its time, each one proved that the concept of its application was practical and feasible. Such was also the case with the .60 cid two-stroke engine.

Why is the .60 two-stroke engine so ideal for modeling? That question must have been given a lot of thought by young William Brown of Philadelphia as well. For all practical purposes, a gasoline-powered model airplane in 1933 was but a dream. Until the 1933 Nationals, that is. Maxwell Bassett, also of Philadelphia, established once and for all that not only were gasoline engine-powered models feasible, they were here to stay. His engine was the Brown Junior. It was a .60 and

ot-Out "The Boss Is Back"

engine photos by ARCE STUDIOS

Back row, left to right, Webra Speed, Picco, Como, O.S., Webra Silverline, Super-Tigre.

the hobby would never be the same again.

What magic formula did Brown have to arrive at such a size? Why not a .50? Or a .40? Whatever his reasoning was, the .60 two-stroke engine has remained throughout the modeling world as the backbone and workhorse for getting our creations around the sky. For sheer power-to-weight formulas, there are few rivals to the .60 two-stroke engine. Modern day engine designs have come a long way since 1933, developing rpm and power Bill Brown never believed possible.

The start of most successful ventures is sometimes a slim thread of possibility that is built upon until it is a worldwide practice, the instigation of which receives little acclaim or acknowledgement. It is quite proper to say, however, that the .60 engine was, and is, the real reason for the success of modeling as we know it today. And so it will be tomorrow. *(Continued on page 76)*

GIANT STEPS

(Continued from page 25)

New Quadra Book

Speaking of engines, "Mr. Quadra," Dario Brisighella of U.S. Quadra in Oak Creek, Wisconsin, is just completing his book, *From the Firewall Forward,* which will be published soon. The book is over a hundred pages and contains everything you ever wanted know about Quadra engines.

Engine specifications and step-by-step teardown and rebuild instructions are included. Dario details all aspects of choosing engines, propellers, fuel mixes, additives, mounts, fuel systems, and everything you might need to know about Quadra's many engines.

Quarter-Scale Spitfire

I mentioned a ¼-scale Spitfire a while back. John Clark of Clark Industries*, the same people who make the Clark Airscrew, called recently to let me know the Spitfire was still in the works. As with many projects of this size and complexity, it has been delayed. It looks like the kit will be ready to ship early this summer. John Clark is a perfectionist and will not send anything out unless it is the best he can manage, and he isn't about to allow the Spit to be anything but the best.

I have more good news from John; future plans for a Hurricane, an FW-190, and an Me-109 are in the works, depending on the success of the Spitfire. Now if you let your imagination run a little, you can see those four famous WW II fighters, at ¼-scale, with more than adequate power to make them really perform. I suspect we're going to see something really spectacular when John Clark realizes his ambitions.

This isn't going to happen overnight, of course. Such developments take time, patience, and dollars. But if John does it, you can bet it will be first class all the way!

To those of you who have taken the time to write, my thanks. It's your input that makes writing a column enjoyable. We columnists need your input to tell us what you need to know and to suggest things you'd like to see covered. If you have any questions, I'll do everything I can to assist you. While I don't know everything, I usually have a good idea of where the information can be found.

When writing, please enclose return postage. In my case, just a stamp inside your self-addressed envelope. Because I live in Canada, the Canadian Post Office requires me to use their stamps, but those I get from you can be used on my own SASE's to the United States.

Let me hear from you on your current project and on what you'd like to see covered in "Giant Steps."

Dick Phillips, c/o *Model Airplane News,* 632 Danbury Rd., Wilton, CT 06897.

**The following are the addresses of the people and companies mentioned in this article:*

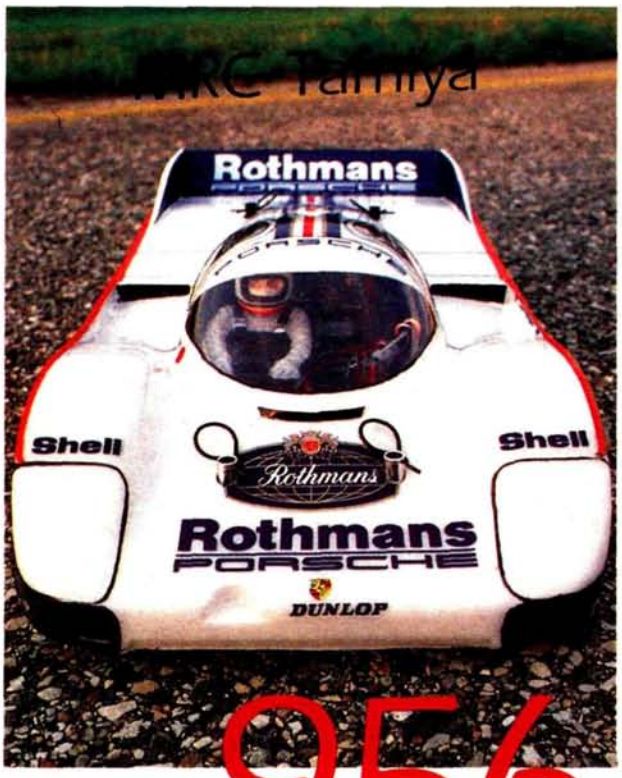
A. Lynn Lockrow, 723 Mercer Circle, Auburn, AL 30830.

Henry A. Haffke, 1038 West Elmer Rd., Vineland, NJ 08360.

Beaulieu's Plan Service, 84 University St., Presque Isle, ME 04769.

P.K. Products, P.O. Box 6226, Hayward, CA 94540.

Clark Industries, R.R. #4, Tottenham, Ontario, Canada L0G 1W0. ■



956 PORSCHE

For super performance and speed, this 1/12-scaler is the Reich Stuff!

by RICH HEMSTREET

WITH THE NEW PORSCHE 956 Racing Master Mk. 5, MRC-Tamiya* has entered the competitive field of 1/12-scale electric racing. Tamiya has done the research and development necessary to meet the competition head-on.

THE KIT. The Porsche 956 is well-engineered. The car comes in a large colorful package and the parts are separated and clearly labeled. Other than a screwdriver, everything needed to assemble the car is included, even the petroleum jelly for the differential and rubber cement for mounting the tires.

The 14-page manual shows step-by-step illustrations. Unfortunately, the instructions are almost entirely in Japanese, with only a few subtitles in English. Despite this problem, the Porsche 956 goes together easily and in logical order.

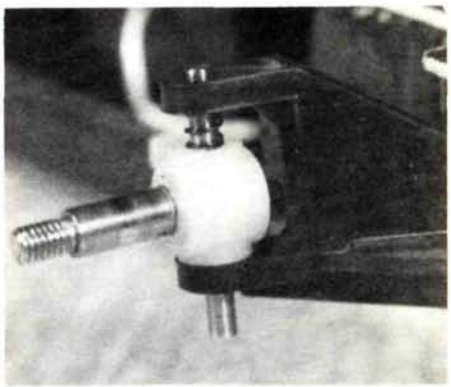
CONSTRUCTION. The chassis and raised radio tray are made of 1.5-mm fiberglass. The front suspension consists of coil springs on the spindles. The rear suspension has slots cut into the chassis which allow the motor/axle pod to flex. A stabilizer connects the rear end to the radio tray and the spring rate is adjustable. An O-ring is used to adjust the dampening rate by friction and you can also

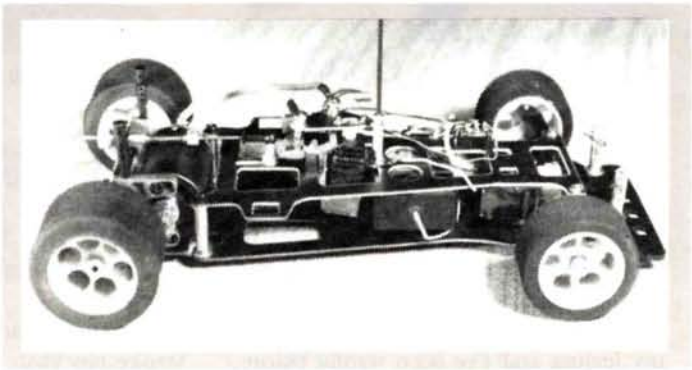
photos by RICH HEMSTREET

Bahn-Stormer

Either on the streets of LeMans or in your own driveway, the MRC-Tamiya Porsche 956 will give you chills.

Rugged, shocked front end allows minimum bounce.





change the pivot point of the stabilizer on the radio tray. By moving the pivot forward, you increase understeer and moving it rearward induces oversteer. This one adjustment will dial in your handling very quickly.

Eight ball bearings are included in the kit and the wheels and tires are very lightweight. With the four-cell battery pack, radio, and body in place, the car weighs only 28.1 ounces. The only changes I made were to install a Dean's connector and to toss out the nylon tie straps designed to hold the battery in.

The differential seems complex after using the ball type found on most 1/12 racers, but it goes together easily. One of the more difficult parts to assemble is the servo saver, which can be built to fit one of at least five different servos.

PERFORMANCE. Using the Porsche 956 for four-cell indoor racing requires two modifications. First, the wiring to the radio switch had to be changed to bypass the six-cell dropping diodes. The second modification was harder to resolve. The 956 had uncontrollable oversteering. Even moving the rear stabilizer pivot point didn't correct it, although it did help some. Before the second day of racing, I replaced the stiff rear stabilizer spring with an old ballpoint pen spring. This soft spring allowed the rear end to flex more freely. The stiff spring was probably designed for the heavier and faster six-cell racers.

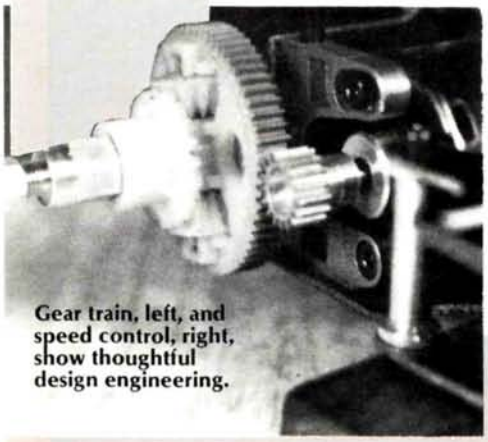
With the new spring in place, the car became fully controllable. The differential gave quick straight-line acceleration and smooth cornering. The RS 540 Black Endurance Motor is very fast and the stock tires worked well on carpeting.

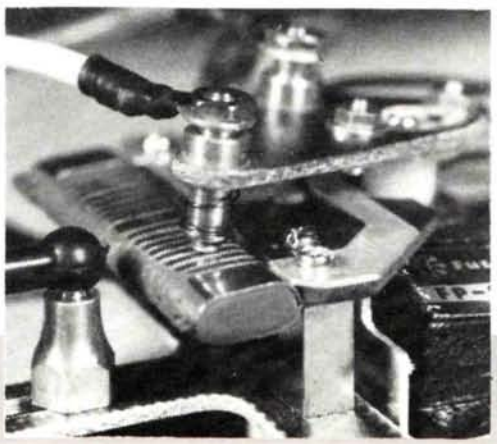
Prior to racing the MRC Porsche 956, I was always five to ten laps off the pace of the local A-main drivers. In my first race after installing the new stabilizer spring, I came in third in the A-main; I was only 1½ laps behind the winner.

All the Porsche 956 needs to become competitive on the national level is a qualified driver. On the local level, the 956 allows a less experienced driver to race a stock car that is equal to the super trick cars of the top drivers. Hopefully the hot dogs won't catch on as we quietly switch over to the MRC-Tamiya Porsche 956 RM Mk. 5.

**The following is the address of the company mentioned in this article:*

MRC-Tamiya, 2500 Woodbridge Ave., Edison, NJ 08818. ■



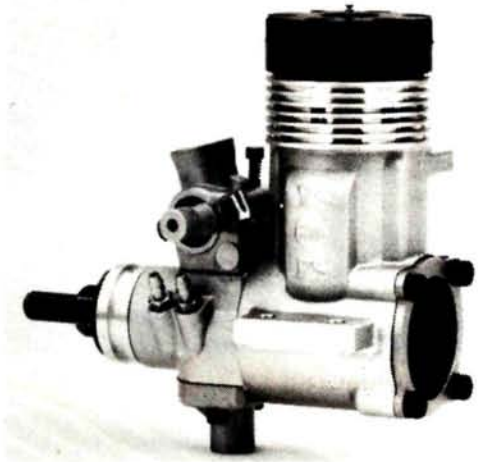


Gear train, left, and speed control, right, show thoughtful design engineering.

Big Engine Shoot

(Continued from page 71)

Fox Eagle III is a real brute.



The YS 60 ABC with integral pump, a potent performer.

Rossi 60 ABC is well made.

The boom in four-stroke engines over the past few years has put the .60 two-stroke on the back burner. Hobby shops all over the world have experienced a drastic decline in the sales of these engines. Some say that they can hardly give them away, but that's only temporary. Many competitive and sport modelers are finding that a four-stroke is fun and different, but in the final analysis the .60 two-stroke is the way to go. Power, simplicity, and weight are the major considerations. I believe we will soon see a rebirth of interest in the .60 two-stroke like never before. This is just my feeling and I've been wrong before, but if you think about it, it makes sense.

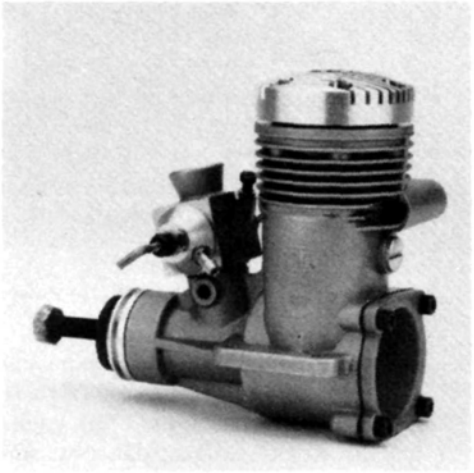
All of the airplanes that have been developed and built for four-strokes, particulary the .90- to 1.20-size models, will fly just as well, or even better, with a two-stroke .60. Almost every pattern flier I know who had used a 1.20 four-stroke has switched back to a .60 two-

ENGINE THRUST DATA

Propellers Used

Engine	Rev-Up 11x7½		Top Flite 12x8		MD 11x10	
Non-Schnuerle-ported	**RPM**	**Thrust**	**RPM**	**Thrust**	**RPM**	**Thrust**
HB 61 Blitz	12,500	7	9,700	7.5	10,300	7.30
ST 60	11,700	6.65	8,500	5.8	8,800	6.25
Webra 61 Silverline	10,500	6	9,000	7	10,000	7
K&B 61	11,000	6.5	9,000	7	10,000	7
Webra Blackhead	12,100	6.85	8,800	6.25	8,800	6.25
Schnuerle-ported						
Fox Eagle III	13,200	8±	9,900	8±	10,300	7.30
YS 60 ABC	13,300	8±	10,000	8±	10,200	7.20
Webra Speed	12,800	7.75	9,700	7.5	10,150	7.15
Picco 61 RCSE	13,000	7.95	8,800	6.25	10,000	7
OPS 60 FISE Ursus	13,000	7.95	9,500	7.4	10,100	7.10
Rossi 60 ABC	12,500	7	9,500	7.4	10,000	7
ST S61 ABC	12,500	7	8,800	6.25	9,800	6.9
O.S. 61 FSR	12,500	7	9,000	7	10,000	7
Como 61	12,500	7	9,400	7.25	9,800	6.9
Irvine 61	12,400	6.9	9,000	7	9,600	6.5
HP 61 Gold Cup	12,600	7.2	8,800	6.25	9,300	6.4

Out

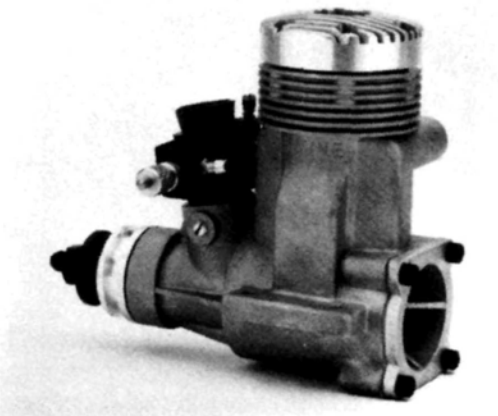


K&B 61, an all-time favorite.

stroke. Ask them what their reasons were.

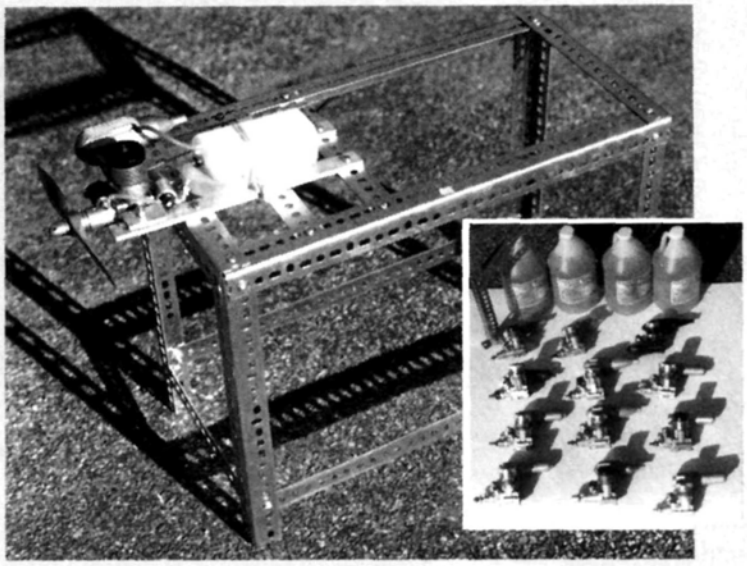
Don't get me wrong. The four-stroke engine is here to stay. It has proven its worth and has found a niche for itself in the hobby. For scale and sport application, it has become a permanent fixture, and we will hear these great engines purring through the sky for a long time. But there is a saturation level in this hobby that usually takes about five years or so to fulfill. I feel that the four-stroke engine has reached that level.

When I decided to do a test on all the .60 two-stroke engines, I immediately realized that there really would be no losers. I say that because the current line of these engines represents the finest pieces of machine work ever available. Virtually all of them are well made and superbly fitted, and perform outstandingly. There was not a dog among them.



Irvine 61 is right up there.

Build An Engine Test Stand



HOW MANY TIMES have you wanted to check the performance of your engine without putting it on a model? To check different props, fuels, plugs, and engine modifications, as well as different engines, a good test stand is essential. It's a pain to have to remove an engine from an airplane, run it, and then stick it back on.

I've always felt that any engine should be properly broken-in and set up before installing it or flying it in an airplane. For one thing, breaking-in an engine while it's in your airplane doesn't allow for adequate cooling of the crankcase. This can cause a heat buildup, working from the bottom up, until your engine seizes up. This can seriously damage your engine, not to mention the effect it can have on your airplane as it glides into the trees!

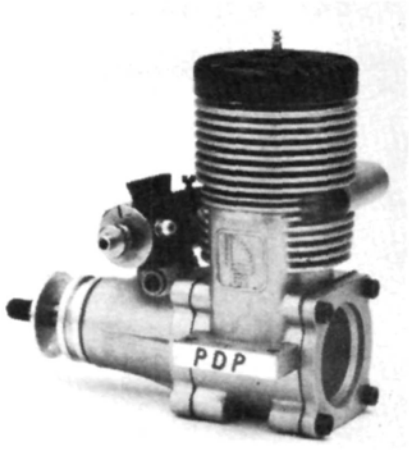
The most common way to break-in an engine is to put it in an airplane, set the needle a bit on the rich side, and fly it around a few times, or until the engine starts to come "in." As stated above, the heating problem can ruin your day. Also, since an airplane in flight is constantly changing the attitude of the fuel tank, fuel flow irregularities can cause your engine to run lean, then rich, then lean, etc. Unless you have an engine equipped with a fuel pump, such as the new Perry Pump or the YS engine with integral pump, the fuel flow is going to change.

Another advantage of running your engine on a test stand is that you can monitor the temperature of the crankcase; something that is very hard to do while flying! This is a necessity while breaking-in an engine, because a bearing that isn't set properly, or a crankshaft that is tight in the case, will give you fits. If the engine is exposed on a stand, you can simply monitor the temperature with your finger. Any abnormal hot spots on the case below the head of the engine mean trouble.

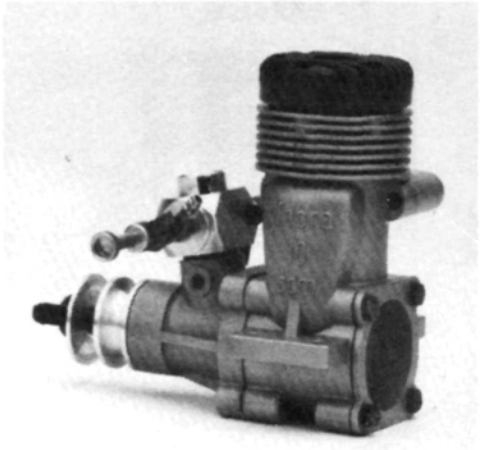
So, the first point to this article is that you should have an engine test stand. You can make your own, but the Tatone* Test Stand is by far the better choice. Several sizes are available, so pick one to fit your needs. To go beyond that and test your engine for performance with props, fuel, plugs, heads, pipes, etc., leads us into the gist of this article.

Someone once said that "necessity is the mother of invention" and this thrust measuring stand is no exception. I needed to have an accurate way to compare the many different engines reviewed in "The Big Engine Shoot-Out" that appears elsewhere in this issue. The hardware, such as the angle-iron, strap steel, and nuts and bolts, all came from the local hardware store. The total cost was about $30. The runners for the thrust measurements came from a cabinet that now has a drawer sitting at an odd angle! These runners, the two slides with the nylon wheels, and the springs are also available at any hardware store. Each spring has a 10-pound tension rating, and I was using this setup for the gasoline engine tests. The scale shows a range of 0 to 8 pounds. This is the range set for engines with displacements

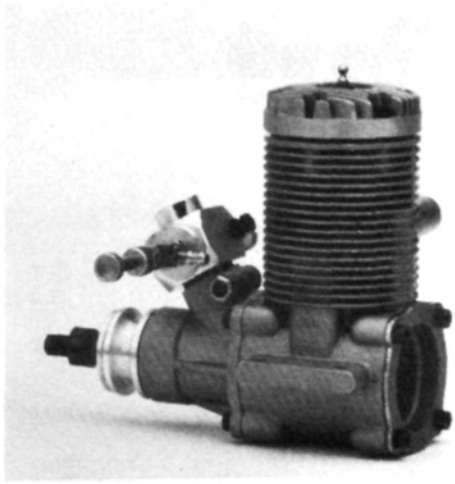
(Continued on page 79)



HB 61 Blitz with PDP, the most powerful non-Schnuerle engine tested.



Webra Blackhead is ruggedly built and performs well.



Webra Speed 61 earns high marks for power an great idle.

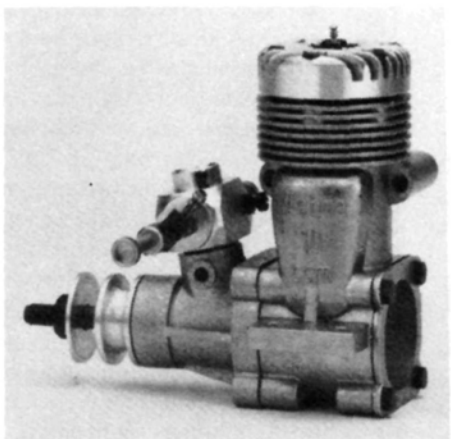
What this means is that you can pick just about any engine you want for your model and get similar performance. In the final analysis it is we, the modelers, who are the big winners in the performance battle. We have at our disposal over 20 different brands of .60 size engines to pick from. Whatever our reasons for choosing a particular engine — be it economy, power, or aesthetic appeal — there is sure to be one among them to fit our needs.

It should be made clear that the tests run on these engines were very limited. A simple thrust vs. rpm figure doesn't tell the whole story.

In fact, without actual in-flight testing, no performance figures will be entirely true. Just as a boat can't really be tested until it's in the water, an airplane engine has to be tested in the air. The propeller needs to work in a forward motion, just like a screw on a boat motor, before you can tell if it's working at its greatest potential. But the tests here do give us the ability to find a potential gang-buster.

That was the case with the Fox Eagle III, and I'll admit that I was really amazed. Here you have one of the most rugged, reasonably priced, and most powerful engines available, and it's American-made at that. We all have a tendency to go for shiny, state-of-the-art gadgets that spell an image or a symbol of status for us. Exotic and refined products only go so far, however. There comes a point in time when you have to put up or shut up. The Fox .60 Eagle III has done that. It's a brute of an engine that, like Rocky, can't tap dance but sure can punch.

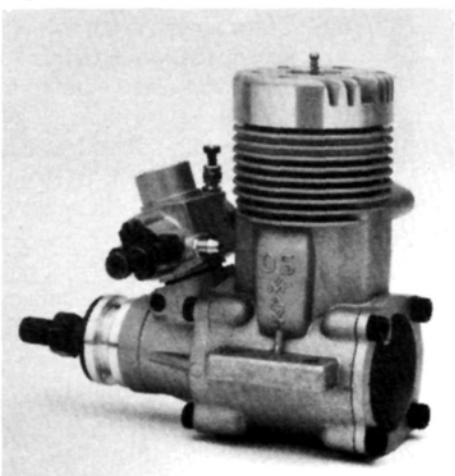
Prior to any test readings on any of these engines, they were all given an equal break-in period. Four gallons of 10% Tower Power fuel were used for break-in and 10% Powr-Fuel from JMD



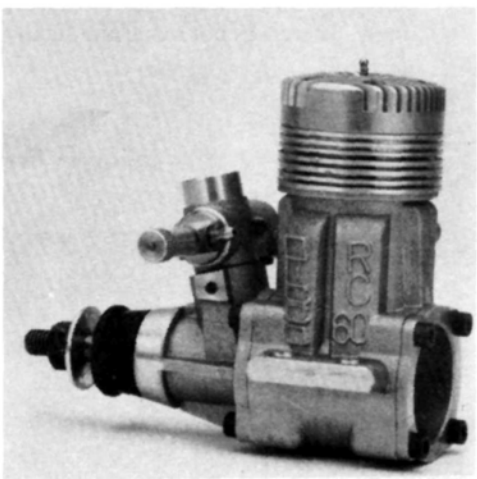
Webra's Silverline is a low-price engine that performs just great.

Super-Tigre 60 is a real charmer.

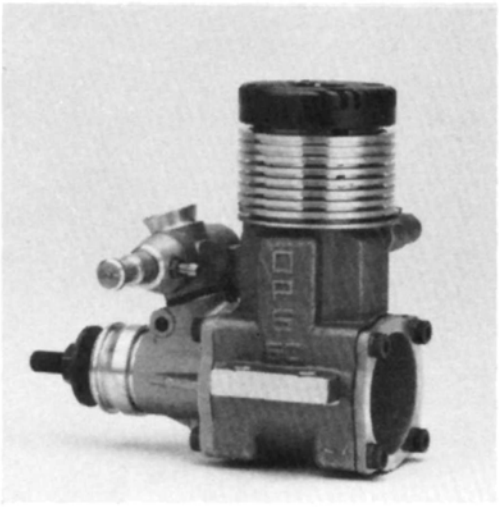
HP Gold Cup has a new carburetor and runs like a dream.



O.S. Max 61 is a fine performer.



Picco 60 could pull a barn.

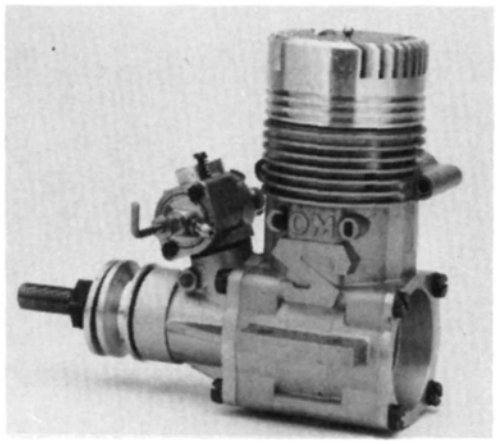


OPS 60 is a beautiful engine with performance to match.

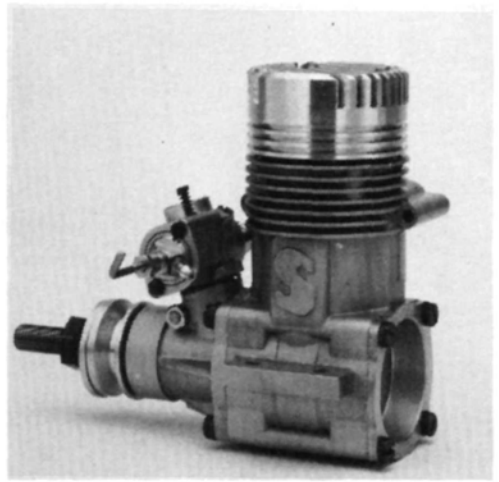
Fuel Labs was used for tests. All of the engines were stock and new in the box when I received them.

The reason for choosing side-exhaust engines to test was that they represent the desired configuration for the majority of sport modelers. Additional performance can be gained by the use of tuned pipes, and rear exhaust engines with tuned

(Continued on page 127)

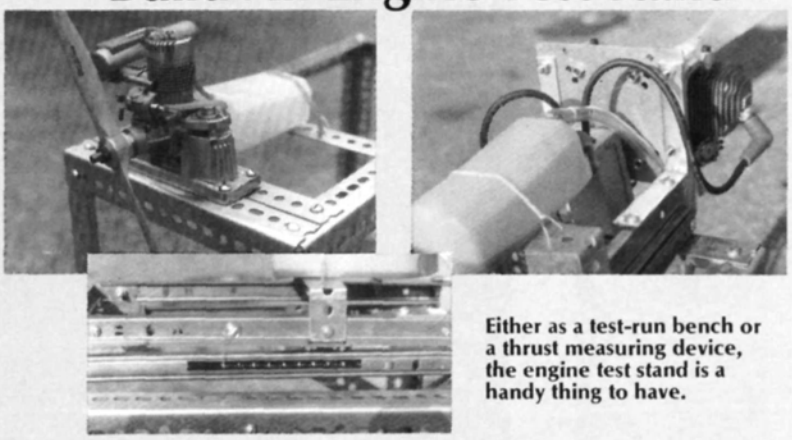


Como 61 rivals the Super-Tigre in all respects.



The Super-Tigre S61 ABC runs beautifully.

Build An Engine Test Stand



Either as a test-run bench or a thrust measuring device, the engine test stand is a handy thing to have.

from .40 to .60 and only one spring is used. For larger engines, such as the gasoline breed, or large glow engines such as the Kavan Twin, O.S. 240 Twin, etc., simply add another spring. The scale should remain the same if you use the same type and length spring. Simply multiply the reading by the number of springs.

Calibration of the thrust measuring stand should be done on an absolutely flat surface, which a carpenter's level will help assure. In addition, when testing an engine, make sure that the stand is level; otherwise your readings will be off. To calibrate the stand, use known weights, such as lead fishing sinkers, a bag of flour, or anything that is accurate. I attached a spindle to the frame of the stand and then tied a cable to the cradle. With the known weight suspended between the cradle, over the spindle, and then toward the ground, I marked the scale on the side as each progressive weight was added.

For safety, make sure you have a bolt installed on the runners just past the highest scale reading to prevent the cradle from coming out of the track after you. Also, when you start your engine, make sure that the cradle is locked down until you are ready to take a thrust reading, otherwise you could find the engine chewing a hole in your belly! I simply drilled a hole at the front end and installed a 4-inch nail that is bent in an "O" fashion at the top. This nail serves as an in-place lock, and is removed easily when you're ready to get a reading. Just make sure you are out of the way when you do.

Since most gasoline engines have different type mounting setups and dimensions, your ingenuity will come into play if you want to test them. I made an aluminum adaptor for the stand that serves as a backplate mount for most of the larger gasoline engines. So far I've run the Sachs 3.7, the Alpina, the Quadra, the Eagle 370 Twin, the O.S. 240 Twin, and several others. This is a great aid in setting up these large engines and in determining what is the best prop to use.

The engine thrust measuring stand is something that you will use more than you'd think. In fact, since I've built this one, I wonder how I ever got along without it before. So will you.

**The following is the address of the company mentioned in this article: Tatone Products Corp., 1209 Geneva Ave., San Francisco, CA 94112.* ■

MATERIAL LIST

Tatone Engine Test Stand (1)
1¼x24-inch steel angle channel (2)
1¼x18-inch steel angle channel (4)
1¼x12-inch steel angle channel (2)
1¼x36-inch perforated strap steel (3)
½-inch diameter x 3-inch long steel springs (3)
Steel drawer runners with nylon wheels (2)
¼-20x½-inch steel bolts (35)
¼-20 steel nuts (35)
¼-inch i.d. steel lock washers (35)
½-inch steel flat fender washers (70)

QSAA FUN-FLY

(Continued from page 49)

Noel Hess of Salt Lake City took Best of Military with his Curtiss F11C-2. Its 35 pounds was capably moved through the air with a Kioritz on the firewall. The workmanship and flight qualities of the model would make it a winner almost anywhere.

Among the very large models present was Nick Ribaldo's incredible OV-10A Bronco. Using two Sachs-Dolmer 3.7s, the Bronco is capable of flight rivaling that of its full-size counterpart. The power available made 45° climb-outs a regular occurrence and the size of the Bronco made it a most impressive bird. At a weight of 55 pounds, the Bronco is just legal and requires a large vehicle to move it around.

Don't get the wrong idea, the fact that the trophies are presented doesn't make this a scale contest at all. The judging is quite unobtrusive and few are even aware it's being done. Some of the judging is based on the opinions (and votes) of the participants and recognition by one's peers comes as high praise. Most of those participating come to enjoy some really "laid back" flying and to spend some time with people of similar interests. The judging and the trophies are an added attraction rather than the be-all and end-all of the rally. While it's certainly gratifying to those who do take home a trophy, the many who do not don't seem to mind at all. In the many years we've attended, we have yet to hear any of the complaining that is fairly common at true scale contests.

Once again, the QSAA has added to the enjoyment of a good many model builders. This enjoyment is the result of a good deal of planning (and hard work) by a small number of modelers, most of whom spend so much time working the rally that they are unable to fly in it themselves. Our thanks go to the many unsung and unheralded people who make this event a success year after year.

Commercial sponsors of the event were Sig Manufacturing, Satellite City, Airtronics, CB Associates, P.K. Products, and Quadra. Lance Machining & Manufacturing of Salt Lake City provided one of their ARF RV-3s as a draw prize. The model, equipped with an Airtronics radio and a Sachs-Dolmer engine, was certainly ready-to-fly!

Tom Bunker of QSAA was director of the rally and its smooth operation was a tribute to his organizational ability. ■

Hobby Shack

E-Z Christen Eagle

Just like its full-scale brother, this third-scale Eagle is nothing but three-dimensional thrills.

by CHRIS CHIANELLI

A FEW YEARS AGO a multi-colored, giant-scale hot-rod biplane, almost ready to fly out of the box, and an opposed twin four-cycle engine would have been a modeler's dream. Today they are a reality. With the introduction of the E-Z Christen Eagle, Hobby Shack* has once again given the words "complete" and "almost ready to fly" new meaning.

THE KIT. When I opened the box, I found myself running to the radio to get the weekend's weather report because I knew I'd have the model completed by then. The Eagle has pre-drilled holes for the cabanes, pre-drilled holes for the wing, hold-down bolts, and dowels, pre-slotted fin and stab for hinges, pre-mounted ailerons; the list goes on and on. The hardware list is also long. All subassemblies are bagged separately to help keep order during assembly and virtually everything needed for completion is included, save radio and engine. Even a big shiny aluminum spinner is found in its own box.

I used Pacer's* Zap cyanoacrylate throughout construction, because I've used Pacer products before and have found them to be very good.

CONSTRUCTION. I'm not going to go into a step-by-step explanation of the assembly because a typical procedure is to pick up the correct screw and aim it at the correct hole. I will, however, touch on a few things.

The Christen Eagle's main components, as in all E-Z kits, are built-up from balsa and ply with a triple-layer skin stretched over them. The cowl and canopy/radio compartment covers are held in place with quick-release clips; once again, all holes are drilled for you. The ailerons are controlled by two servos, one in the center of each wing with a bellcrank system. I did find it a bit odd that the instructions showed only one servo for the elevators. Not that this is bad if you

photos by LOUIS V. DeFRANCESCO JR.

have a strong servo, but it's so simple to use two servos and a Y-cord. It's also 100% more insurance with a model of this size.

The firewall comes marked for a Saito 270 or an O.S. 240. The firewall is nevertheless undrilled so you can use any two- or four-cycle engine. I used, as I'm sure you've already guessed, an O.S. FT240 twin four-cycle from Great Planes Model Distributors*. Four-stroke flat twins, in my opinion, are the ultimate in model engines. They aren't overly complex, they are exceptionally smooth, and they run very much like a full-size powerplant. The 240 is so finely finished you could set it on your mantle piece as a work of art, and it runs as good as it looks.

Right out of the box it turned 7,100 rpm on a Top Flite 20x8 prop and idled down to 1,400 rpm with no power to the plugs, and that's with only one previous tank for a slight break-in. Even with a very rich setting, the engine responded immediately, from idle to high speed.

The weight of the Eagle, with O.S. 240, 1,200-mA battery, guide wires, struts, and stab braces was 15 pounds, 12 ounces. For a model of this size, the wing loading is respectable: it's just under 30 ounces/square foot.

FLYING. And now for the fun. The Eagle's ground handling is very predictable with no tendency to ground loop or veer off. The first takeoff was quite effortless and picturesque. The model felt so solid that I started doing aerobatics. To be concise, the model, like the full-scale job, does it all: knife-edges, clean snaps, inverted spins, and so on. After all, this was its itended use.

What surprised and impressed me the most were the slow flight characteristics. A lot of people tend to shy away from bipes of this type because they feel they tend to jump up and bite, and in many cases that's true, but not with the Eagle. I took the model to a safe altitude and began to impart much abuse on the elevator. The Eagle would simply mush around the sky and drop its nose in a straight-ahead stall.

So if you don't believe dreams come true, some day the UPS man may bring three boxes to your front door, two marked "E-Z Christen Eagle" and one marked "O.S. FT240." Open these boxes and then tell me what you think.

**The following are the addresses of the companies mentioned in this article:*

Hobby Shack, 18480 Bandilier Circle, Fountain Valley, CA 92728-8610.

Great Planes Model Distributors, P.O. Box 4021, Champaign, IL 61820.

Pacer Technology & Resources, 1600 Dell Ave., Campbell, CA 95008. ■

SPECIFICATIONS

Type: *Giant Scale*
Scale: *1 foot to 3.8 inches*
Wingspan: *63.4 inches*
Wing area: *1,162.5 square inches*
Length: *54.8 inches*
Weight: *15 pounds*
Radio: *4-channel*
Engine: *O.S. 240 four-stroke twin*

All struts, linkages, etc., are conveniently arranged for simple access.

FLOATING AROUND

by JOHN SULLIVAN

THIS MONTH I'D like to introduce you to the most venerable member of our club. I'm referring to the "Napa Valley Miniature Aircraft Society Aquatic Recovery Vehicle" (or boat). Legend has it that this remarkable craft was discovered in an archeological dig in Central Africa at the turn of the century, and Carbon 14 tests place its origin somewhere in the late Mesozoic era, over 63 million years ago.

But those of us who know better realize that Ron Porter bought the boat from a defunct hunting lodge in Missouri and carried it to California on the top of his Chevy station wagon in 1974. Either way, this boat has led a hard life. Every rivet in her bottom has been punched out and patched with aluminum plates and silicone. As a final test of her mettle, Mike Johnson took a skill saw and cut 2 feet out of her aft section so she would fit in my van.

The point of all this is that if you're going to fly on floats, you're going to need a boat, but it doesn't have to be a very good one. Just make sure it won't leak and has adequate flotation.

The other photos are of Bill Curry's Schluter Superior on floats. Bill's chopper weighs 11 pounds and is powered by an O.S. 60FSRH with a Schluter muffler. Guidance is provided by a JR Unlimited Series helicopter radio with a JR gyro.

It's interesting to note that Bill lives less than a mile from our flying site and has heard our activity on Sunday mornings for about 3 months and never stopped over to see what was going on. There seems to be a myth regarding float flying (it's difficult, fraught with danger, etc.) that keeps modelers from trying this aspect of the sport. It's my hope that this column will dispel those fears and change that attitude.

A necessary ingredient of float plane flying is a method of retrieval.

I finally ran into Bill when I sought permission to photograph a full-scale Pitts S1S at the Angwin airport and it turned out to be his plane. A lively conversation followed, and, within a week, we had Bill's Superior on floats. To expedite matters, Bill bought a pair of foam cylinders 4 inches in diameter and 24 inches long, rounded the ends, and glued the floats to a plywood cradle. In short order, he coated the foam with white glue, sprayed it with Black Baron silver epoxy paint, and brought the chopper down to the lake.

One benefit of flying on floats was immediately apparent: with the chopper in the water and running at a speed just before collective kicks in, it's possible to trim for cyclic forward, aft, right, left, and tail rotor without lifting off! The chopper shifts around easily on floats and reacts noticeably to trim changes. This has got to be a boon to low-time pilots, and there's another bonus: no more broken blades, bent shafts, mangled frames, and the like. Water is soft compared to *terra firma*!

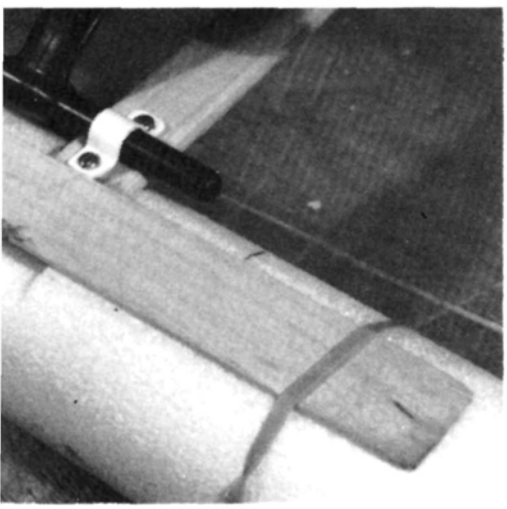
In a future column, I'm going to discuss the effects of dumping airborne gear in the water but the long and short of it is that there's no effect at all if you follow up with proper maintenance. Run your motor after the spill, dry out the radio and servos that night, and fly the next day.

The other photos are of George Graff's completed Arrow Sport (from *M.A.N.* plan #340; plans $8.00, exploded view $3.50, both $9.50), which I've mentioned previously. I listed a projected finished weight of 8¼ pounds but I had underestimated the toll that 7 years of repairs had taken and George wound up with a finished weight of 10 pounds and a wing loading of 27½ ounces per square foot. After stripping the plane of its original covering, George remarked that he couldn't believe, or remember, half the repairs that had been made on the Arrow Sport.

At any rate, this is one beautiful float plane. George re-covered the Arrow Sport with Super Coverite and Black Baron epoxy in cream and light blue with black stripping. Power is provided by a K&B 60, with an Irvine carb swinging an 11x6 prop. An 8-ounce tank gives George flights of 15 minutes plus.

While taking a close look at George's plane, I'd like to cover the spatial relationship between a set of floats and the craft they carry. There are three easy items we can set aside right away. The step should be located directly under the plane's CG or slightly behind it. "Slightly" means no more than an inch. The spread of the floats is determined by the plane's wingspan. Twenty percent is a good rule of thumb until you get into high aspect ratio wings (gliders, etc.) where it's best to block up the various components on the building table and shift things around until it looks right. Lastly, I'd suggest a clearance of at least 1 inch between the bottom of the prop arc (largest diameter you'll use) and the float deck.

The most important aspect of aligning floats to a fuselage is the incidence relationship between the floats and the



Close-up of Shluter Superior float setup.

George Graff proudly shows his beautiful Arrow Sport adapted to floats.

flying surfaces. In a world without problems, it would be as follows: flat-bottom wing with underside set parallel to thrust line, float deck parallel to wing's underside; symmetrical wing, float deck at 0/0 to a line drawn between the center of the wing's leading and trailing edges; semi-symmetrical wing 1° negative incidence between the float deck and a line drawn between the wing's leading and trailing edges. In a world *with* problems, you might encounter flat-bottom wings with 6° positive incidence (old timers), lifting stabs (Telemasters), biplanes in general, scratch-built home-brews, and anything designed by Hal deBolt or Bill Winter. The way to approach a mind-boggling setup is to determine the plane's attitude in normal flight and mount the floats parallel to that attitude. If one were to err in this matter, I'd suggest an angle factor of 1° negative incidence at the float deck.

Bill Currey's Schluter on floats doing its thing.

George's setup was a snap. The floats were mounted parallel to the Arrow Sport's symmetrical wing and spaced 12¾ inches center to center (20%x63-inch wingspan). Prop clearance is 1¾ inches, which allows George to go to a 12-inch prop if desired. The Arrow Sport is a fantastic performer on the water and in the air. On a calm day I've seen George run at top speed with down-trim dialed in and the forward slope of the floats flat on the water. As he sped past he began to trim to neutral, and at one click of up, the Arrow Sport rotated and climbed straight out. Taking off on a runway was never like that.

Clear Lake Fly-In

The Clear Lake Modelers Club is hosting its annual R/C Seaplane Fly-in on May 10 and 11, 1986. The event will be held at Lakeport City Park in downtown Lakeport, California. Contact Bill Gresham at 707-998-3952.

I covered this event in the September 1985 issue of *M.A.N.* and it was really something to see. It's the biggest float plane event in the U.S. and usually attracts 120 to 150 models, so if you're anywhere in the area, plan on attending. You won't be sorry.

John Sullivan, c/o *Model Airplane News*, 632 Danbury Rd., Wilton, CT 06897. ■

4-CYCLE FORUM

(Continued from page 37)

Ron says, we haven't heard about others having quite the same problems.

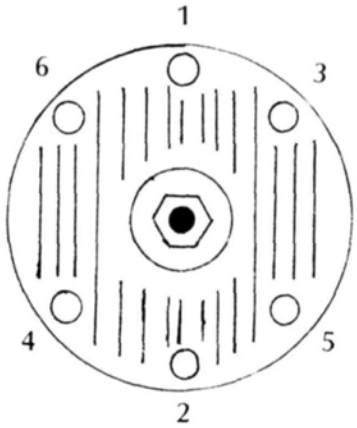
My first action was to fire off a copy of Ron's letter to the O.S. company for their comments, if any. I'll share any answer with you in a future issue. In the meantime, there are a couple of points worth mentioning.

Initially, I must must confirm that there has been a power loss. Since few of us have any kind of a torque or horsepower measuring device, our only means of doing so is a good tachometer. To be really fair and accurate about rpm tests, we must do what the Formula I fraternity practices: make all tests with the same propeller. This doesn't mean another propeller of the same brand, diameter, and pitch, but the same propeller should be put aside as a test prop, and used every time comparative rpm readings are to be made. It would be nice to also make all tests under the same temperature and relative humidity conditions, but since this isn't possible, at least remember that there will be some differences between rpm readings taken during the summer and those taken in the winter!

If indeed the engine's performance has dropped off, I still think it is best to first think of it and troubleshoot it as a model airplane engine, and not as a *four-cycle* model airplane engine. Look for the common problems you know of from past experience with two-cycles. For example, in the case of an rpm loss, we know that one of the causes can be nothing more than the glowplug. Even one which glows healthily outside the engine can have a distorted element or some other fault that will cause it to malfunction at high rpm and compression. Engines have been known to leak around the screws that are used to hold them together. A small amount of silicone applied around the screw and in the hole as it's installed will cure that.

Is your head on straight? Don't take that as a personal criticism; I'm asking about the head on your four-stroker. It's always been important, but more so on the more complicated assemblies we're now using with valves, valve guides, rocker arms, etc. It's possible to install the head incorrectly, by simply tightening the holding screws completely one at a time. This places it under stress, and it will become aggravated when it's hot; enough so that it will be too distorted in shape to allow all its associated mechanisms to operate freely. The head screws should all be put on, tightened just until they're snug, and then, referring to them in relation to a clock face, tightened a little bit at a time, in a 12:00, 6:00, 2:00, 8:00, 4:00, and 10:00 sequence. They should be retightened after the engine has been run a couple of times, again in the same sequence.

Please refer to the sketch for further clarification of this procedure. If the head is completely snugged down on one side, it will lift up on the other side, and something will have to give before it can be pulled down into position.



These are all generalities and are certainly not meant to say that our flying friends in Massachusetts are not seeing what they write about, so let's talk about that a bit.

It's a bit much to expect a perfect valve seal in engines as small as ours, especially when they're cold. All engines depend on certain operating temperatures for proper operation, and the smaller they are, the more critical tolerances and clearances become. Again, returning to your two-cycle days when you could peer up into the combustion chamber through the exhaust port, how many engines can you remember in which you couldn't see bubbles and leakage as the engine was turned to compression? Very few, if any, yet they all ran acceptably well. A prime example of cold to hot differences is the ABC engine, which feels like it's grinding itself to pieces as you turn it over cold, but is one of the fastest turning types of engines. Common sense tells us that such an engine couldn't run, much less run at those speeds, if that friction remained when it was running.

Somewhat similar conditions exist in the four-cycle engine and its valve mechanism. Valves that leak when the engine is turned over by hand when the

engine is cold, will not do so, or not do so quite as much, while the engine is running. Remember that during the compression stroke, and definitely during combustion, there's a very high pressure inside the combustion chamber, which will exert force on the valves, helping them to seal better.

Lubrication could be a contributing factor. Oil residues could collect on the valve train and stems, making them sluggish in operation when cold, but not when the engine is warm.

The only sure cure would be heavier springs and lapping. I don't recommend the former because you'll probably affect engine operation in other ways. Lapping must be done carefully, and not with the auto store valve grinding compounds, which are much too coarse for this use. The finest lapping compounds generally available are "4A" grade. Use it sparingly, followed by jeweler's rouge for a final polishing. Valve grinding should only be attempted if there are obvious visible differences in the wear pattern around the circumference of the valve face and the seat.

So much for my thoughts on the subject, which I don't consider closed by any means. I'll see what word, if any, comes from Japan, and if you have experienced similar problems, or have a firm fix for these problems, let me know.

From the Frozen Wilds of Wyoming

I just received word from the Guru of spark ignition, Bill Carpenter of C.H. Electronics*, that the add-on Electronic Spark Control for his well-known spark ignition system is now available. This device, called the ETC, will plug in directly between the pulse switch and the ignition module. To set it, you set the timing position at high throttle; when the rpm is reduced, the ETC automatically retards the spark. The price has not been set, but future models of the C.H. Ignition System will have the ETC built right into the module.

Bill also reports good results with regular gasoline, methanol, and Klotz KL-100 lubricant. The latter is a mixture of synthetic oils blended with 20% castor oil. Bill's recipe is 2 quarts of methanol, 1 quart of gasoline, and 8 ounces of KL-100. This works out to 8.3% oil, less than most commercial fuels have, but Bill also claims that he's used as little as 5% for prolonged periods without ill effects. Bill believes this is possible due to the timed ignition point—and, of course, the proper care in the setting of the needle valve.

The Klotz Oil Company* mentioned above isn't an unknown name to most of us. However, it might be interesting to know that it makes more products than just "Klotz Oil," or KL-100. Many Klotz products are formulated especially for model engines, and complete information is found in the booklet entitled "Model Synthetic Lubricants, Castor Lubricants, and Power Additives." A copy is yours for 50 cents from the Klotz company. You'll find it interesting reading, but don't forget to be here again next month!

Eloy Marez, c/o *Model Airplane News*, 632 Danbury Rd., Wilton, CT 06897.

**The following are the addresses of the companies mentioned in this article:*

Hobby Shack, 18480 Bandilier Circle, Fountain Valley, CA 92728-8610.

Goldsmith Scientific Corp., P.O. Box 318, Commack, NY 11725.

C.H. Electronics, Inc., Box 1732, Riverton, WY 82501.

Klotz Special Formula Products, Inc., P.O. Box 11343, Fort Wayne, IN 46857. ■

SUPRA-FLY

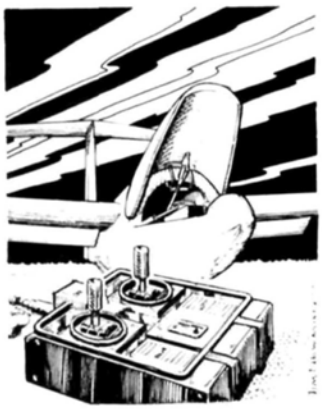
(Continued from page 22)

win as many qualification rounds as possible, and I was able to enter into the finals with the maximum score of 3,000 points. Due to strong and turbulent crosswinds during the finals, my goal was to perform safe flights and to avoid any risks in avalanches, turns, and spins. By receiving a total score of 4,998 points, I just missed the maximum available score of 5,000. This was my best result at my four World Champ victories and I received it with my perfect model and perfect equipment.

Supra-Fly has outstanding vertical performance. To perform horizontal maneuvers it is only necessary to use 50% power. At the World Champs I used a completely new designed crankshaft. The new timing delivers an awful lot of torque at low rpm and my Super-Tigre S.61 ABC turns an 11.5x10.2 prop very easily. At the noise check the reading was 100-102 dB. This engine with the long "quiet pipe" will be available in a limited edition at the beginning of next year.

I'm very happy with my new design, the Supra-Fly, and will use it during coming years. It is a high-efficiency aerobatic model, but with smaller engines (.45-.51 two-stroke; .60-.80 four-stroke) it can be flown easily by intermediates. Supra-Fly is a perfect flying model with all outfits for the new constant speed style of flying.

For those of you interested in Hanno Prettner's exciting new plane, the Supra-Fly, Hobby Shack (18480 Bandilier Circle, Fountain Valley, CA 92728; 1-800-854-8471) will be kitting this plane in E-Z kit form and it will be available in Spring of 1986. The kit will be super aerobatic and precision engineered. Please contact Hobby Shack for further information. ■



SOARING NEWS

by JIM GRAY

WHEN IMPORTANT and exciting events take place on the other side of the world, you can bet that Americans will be there watching, asking questions, and participating.

Last April, the FAI F3B World Championship R/C Soaring meet took place in Australia. You knew that, of course, and probably also knew how the U.S. team came out—and even who the members were—but did you know that many Americans went over just to watch and to vacation? What an opportunity to see a country (island continent actually) as big as the United States, and two smaller islands every bit as interesting and even more beautiful, if that is possible! I'm speaking also of New Zealand, and that's where a good friend of mine writes from and tells about his visitors from "the States."

Glen Spackman usually writes a couple times a month, sending photos and comments about soaring in Paparangi, New Zealand (near Wellington). This time, the news and photos were of two itinerant Americans, both of whom you've heard me talk about before: Kale Harden (International Postal R/C Soaring Contest organizer) and Walt Good (well-known for his electronic contributions to R/C soaring and for his presence at meets everywhere) and their wives Joyce and Audrey.

Paul Hamel, left, and Dr. Walt Good with the Leprechaun, a giant free flight sailplane converted to R/C assist.

Glen says that this foursome came over for a week following the Championships and, because April 25 was a public holiday, the residents of Wellington came out for a "fly-your-glider-and-meet-Kale-and-Walt-from-America" day. Not incidentally, the Wellington group flies in the Postal competitions staged by Kale, so Kale and Walt were no strangers. According to Glen:

"The first photo shows Paul Hamill of the WMAC on the left and Walt Good on the right, posing behind a Leprechaun, a low aspect ratio, free-flight model from the '50s. It's from an *Aeromodeller* plan and is flown in New Zealand as a two-channel R/C ship, going up the line slowly and floating around in the sky a bit like a blimp—fascinating to watch.

"Walt was able to put in several flights on this ship, and Paul slope-soared it off a small hillock at our slope site in a 12-knot *southerly* wind; said site normally requiring a *northerly* breeze.

"Walt and Kale flew my Gemini. Walt flies a Gemini (Ed Slobod design from Pierce Aero) in Florida, and commented that mine at an all-up weight of 66 ounces (after heavy repair following an impact with a flagpole) has similar characteristics to his ballasted Gemini. Kale and Walt both flew the Gemini, and Walt managed a good 10-minute flight

Terry Luckenbach launches his scale ASW-20 fiberglass sailplane at LISF contest.

when he launched it into a small front coming through.

"The Gemini is done in one of my more 'subtle' color schemes; i.e., circus pink, black, white, yellow, and blue! Many WMAC members took the opportunity to meet Walt and Kale, particularly the 'Old Timers' who were aeromodeling back in the '30s and had followed Walt's Rudder Bug experiments with interest. Among them was Les Wright who was a pioneer in New Zealand aeromodeling. I believe at one stage Les held the New Zealand, and possibly the world's slope duration record back in the 1950s.

Dwight Holley launching his famous World Championship design, Gobbler. Kit is available from MEN, Norwalk, Connecticut.

The LISF Junior brigade flinging their "chuck" gliders into a mass takeoff. See text for details.

"So, I can say that the International R/C Soaring Postal Contest has been a success, as it has assisted in linking R/C glider fliers around the world. I can recommend Postal Contests to clubs because they give the contestants an opportunity to fly as well as to correspond with each other, and—in some cases (as with Kale and Walt)—to visit with fliers in other countries. Glider fliers tend to speak a common language.

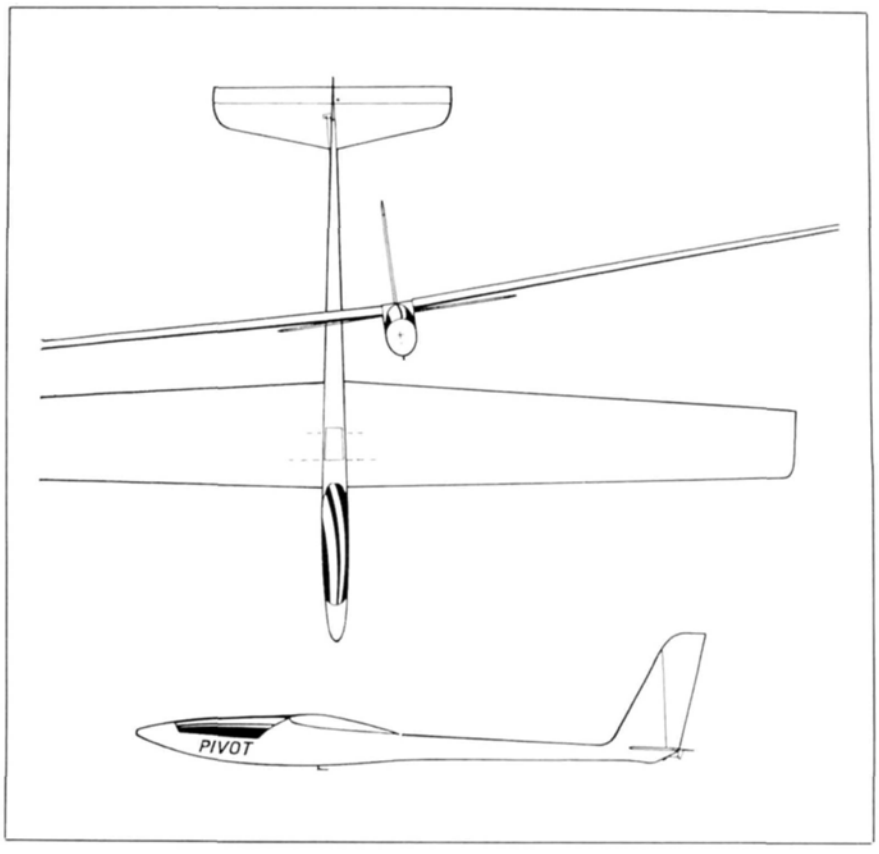
"It seems as if Kale has found about eight clubs per postal contest is about all that can be comfortably managed, due to the difficulty in organizing and the cost of airmail postage. Perhaps *M.A.N.* would be interested in setting up some Postal Contests. I don't think that they would necessarily have to follow Kale's contest tasks (although these do give a good contest).

"What do you think would happen, for example, if a club in England and one in the U.S. were to write to you at *M.A.N.* and say, 'Okay, we will run a thermal contest once a year on a certain date and we would like clubs from several other countries to join in. Here are the basic rules. The USA club contact member is (name/address). Write to him if your club is interested.' Then you could step out of it and the clubs could organize the affair themselves. All you would have to do is to offer the initial invitation. What about it, Jim?"

Well, Glen, you have a clever way of involving me in your schemes. Sure, I'll be happy to make the initial invitation through this column: Clubs here and abroad, write to me at the address at the end of the column if you would like me to "middleman" a Postal Contest among you. As Glen says, once the introductions are made, I'll step out of it. The idea is a good one, and I've been interested in promoting something like this for quite a while. Why, I'll bet that even our friends at *M.A.N.* might kick in a trophy or two. We could call it the *Model Airplane News* International Postal R/C Soaring Trophy. I'll bet we could do that, and I'll bet that it would be welcomed enthusiastically. So, clubs here and abroad, this is your chance. I'll be the "goat."

Pivot Flies

At the Nats in late July, Bob Dodgson of Dodgson Designs* introduced his latest creation: a pivot-winged, hand-launched sailplane called (what else?)



Pivot. It's a pretty little ship of typical Dodgson construction: "Taco Shell" fuselage of fiberglass and sheet balsa, sheeted foam wings, and built-up tail surfaces. It weighs 17 ounces ready-to-fly, and the prototype made many friends at the Nats. Here are some specs for you to look at: span 60 inches; area 350 square inches; aspect ratio 10.3:1; loading 7 ounces per square foot; airfoil Eppler 387; and mechanical coupling between wing pivot and rudder, so that only two micro-sized servos need be used for turn and pitch control. The price is $69.95 for the kit, and they are in stock for delivery now.

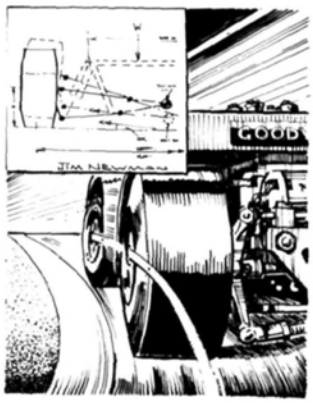
LISF Affair

Ray Juschkus of the Long Island Silent Flyers Soaring Club sent in some super-nice shots of the club's June 29 and 30 soaring contest. Dwight Holley was there, and is in some of the photos. Concurrently, LISF ran a contest for the "small fry" using balsa "chuck" gliders; age categories were 5 to 7, 8 to 10, and 11

Hans-Dieter Konig of Calgary, Alberta, launches his 160-inch span Expresso for some ridge soaring.

to 13. The contest for the kids was free and the club supplied balsa gliders, which the kids got to keep. The idea was to spark interest among the younger folk, and to encourage them to come out to the field with their parents and older siblings to take part in soaring. The picture shows 18 of the youngsters pitching the gliders into the air. So I guess the idea worked very well. Congratulations, Ray and LISF, for "carrying the fire."

(Continued on page 108)



INSIDE TRACK

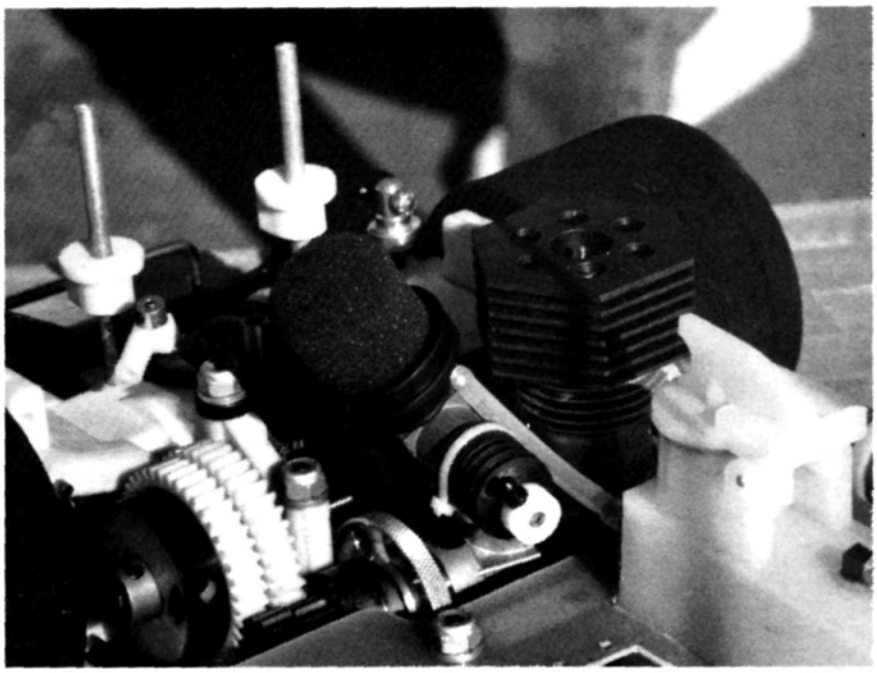
by MIKE LEE

THIS MONTH, I want to talk about throttles and how they affect a car's performance. This not only applies to electric cars, but to gas cars as well. How the throttle responds to your command will determine just how effective a driver you are on the track. Having the proper throttle response is a key factor in putting the car where you want it. A lack of good throttle response can put your car in many places other than where you want it, most of the time back in the pits.

For the gas guzzlers, throttle response means getting that nitro-burning powerplant to move. It's frustrating when an engine bogs down when you hit the throttle. It can't be trusted on the track, let alone getting you anywhere. This is where you set the low-speed needle to get that throttle to crack into high gear.

Setting the low-speed needle is really quite easy using the following method. After setting the high-speed needle, bring the throttle to idle and let it sit for about ten seconds. Pinch the fuel line to totally cut off the flow of fuel and listen to the engine. If it begins to pick up rpm and then dies, the low-speed needle is set too rich. When the engine begins to rev, that is actually the excess fuel in the crankcase being burned off, indicating a rich condition. You should begin leaning out the low-speed needle from here in increments of one click at a time. If the low-speed needle is not serrated and does not make clicks, then turn the needle inward not more than ⅛ inch at a time. Each time you make an adjustment, perform the pinch test while listening to the engine. Ideally, the engine should maintain the same sound and then die, with no increase in rpm allowed. Some decrease is going to happen, but not an increase.

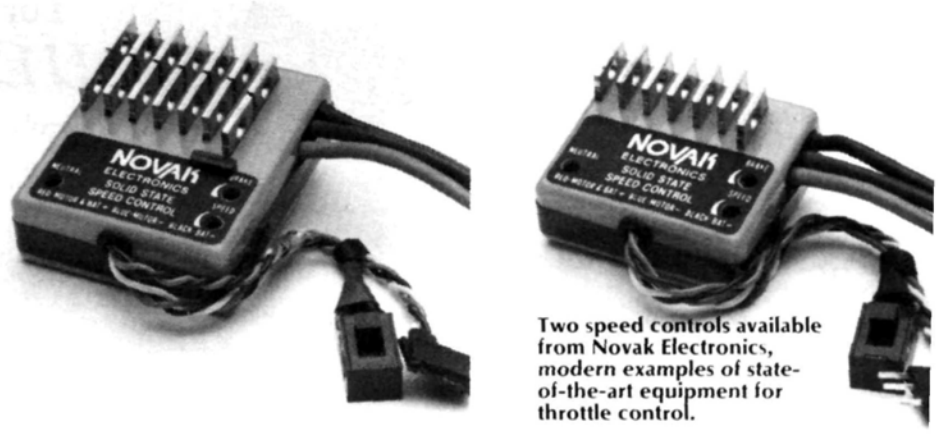
If the engine displays a tendency to abruptly die when pinched, the low-speed needle might be too lean and this will cause the engine to crack open so fast from the idle that it will die before hitting high rpm. In this case, move the needle outward until the throttle response is good and reliable, and isn't picking up rpm during the pinch test.



A typical gas car setup with slide carburetor. Setting a throttle response to your liking can be made easy. See text for details.

The result will be an engine that has a good, solid transition from low speed to high speed without bogging or over-revving on the low end. Throttle response will be very progressive throughout the powerband, and plugs will last a lot longer. It gets expensive when the plugs disappear on every run.

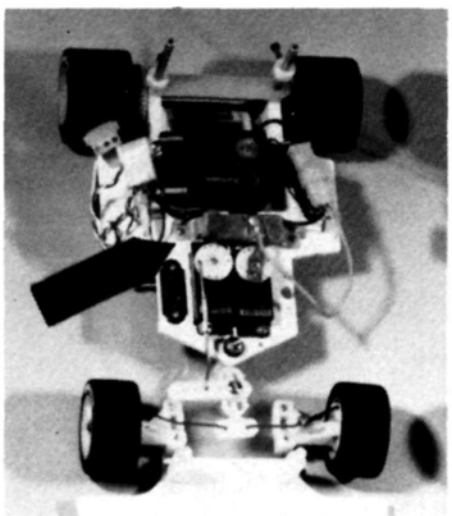
In the electric-powered cars, the idea is to have a throttle that is progressive in response rather than an On/Off switch. Granted, many car kits feature speed controllers that have several steps in speeds rather than a fully-proportional throttle. This means that the motor is fed



Two speed controls available from Novak Electronics, *modern examples of state-of-the-art equipment for throttle control.*

power from the batteries in terms of voltage percentage. It may get about 25% power in low speed, 70% power in medium speed, and a full 100% power in high speed. While this may suit some drivers in the off-road scene, such as the serious dirt racer, it isn't at all desirable in road racing.

Ask any experienced driver what one of his secrets to making a good track time is, and he will tell you, "being smooth on the track." That means taking corners without spinning out or throwing



Electric road racer displays common ceramic resistor speed controller with contact wiper.

monster rooster tails. It looks great, but it's really a waste of time and energy. The fastest way through a corner is bringing the car to it as fast as possible and accelerating smoothly through it. You can't accelerate smoothly if the throttle has only three speeds to it.

How do we change this to get a smoother-reacting throttle response? One of the simplest ways is to throw away that three-step speed controller and install an electronic speed controller. This item, although initially expensive compared to the standard speed controller, is capable of being absolutely linear in response. Linear response means that it will react exactly to the amount of throttle command the driver sends from the radio.

The electronic speed controller takes the place of not only the old speed controller, but of the throttle servo as well. It simply plugs into the receiver just like the servo, and additional plug leads allow the battery to be connected to the motor. Some electronic speed controllers also feature adjustable brakes and a reverse speed.

Something worth mentioning for drivers who are weight conscious is that the electronic controllers are very lightweight and compact. Even open-wheeled 1/12 electrics can fit them under the skin comfortably.

When using the electronic speed controller, exercise caution at all times. The controller is very sensitive to reversed polarity and it usually gets smoked the first time the polarity is wrong. It's good advice to use polarized plugs for the leads. Also, many of the controllers feature a finned heat sink to dissipate heat from passing voltage. Don't block in the fins from air that could be circulating around them. Heat will destroy the controller in short order.

When setting up the controller, make sure you read the instructions and understand them completely before hooking it up. Most times, the setup is fairly fast and simple. Follow the instructions to the letter because if you screw up one time—POOF!—you might have a smoked controller.

Another type of speed controller to consider is the multi-band resistor type, commonly seen in Associated cars. This type of controller has up to a dozen different bands of resistance wire wound around a single ceramic cylinder. A copper wire is used to make contact with the resistor and to vary the amount of voltage passing through the controller. Reaction time from this type of controller is dependent on the speed of the servo moving the wiper. In a fast-reacting radio set, response is almost instant.

Using the multi-banded resistor provides for motor speeds for as many bands as are present on the resistor. In other words, if there are a dozen bands on the resistor, you'll have a dozen separate speeds. Obviously this is far better than having only three speeds, and smooth control can be easily derived.

Now, take into account that there is a load on the car's motor from driving on the track. This will tend to smooth out the response between any of the dozen or so bands. Properly done, and this isn't hard, a multi-band resistor is hard to differentiate from an electronic speed controller.

There are a few other tricks to be done with throttles, but for now, let's stay with the basics and keep the car in dependable shape. Keep them simple and dependable is what I say.

R/C Car Action

Wow! Have you all noticed what a big, booming sport this car business is? Why, there are new cars and trick items on the shelves every day. In fact, there is even a new magazine out there for the car enthusiast from the guys who brought you this magazine. It's called *R/C Car Action,* and it's packed with great car information, reviews, tips, and how-to's, even how to set up your own racetrack! I'm proud to be a part of this new publication, and I think you'll really enjoy it. At last, our own magazine. Check it out at your local newsstand or hobby shop, or get a subscription by filling out the coupon in the ad on page 135 in this issue and send it with your check or money order to Air Age, Inc. Credit card holders can call the toll-free order line (1-800-243-6685). I'll be joining you there.

Meanwhile, foot to the floor and happy motoring.

Mike Lee, c/o *Model Airplane News,* 632 Danbury Rd., Wilton, CT 06897.■

JET BLAST

(Continued from page 47)

Also from Bob, but still experimental, is the RK-720. Much in the manner that the RK-740 used the same diameter shroud as the RK-20 but with a .40-size engine driving a 7-bladed rotor, the 720 will be about the same diameter (3 inches) as the RK-049, but will use the K&B 3.5 which, as I said two years ago, will create a lot of "orphan" TD .049s.

K&B has assembled a few "warmed over" 3.5s which are actually displacing .28 rather than the stock .21 and reports of 24,000-plus rpm in an RK-20 keep filtering in. That equates to nearly 5 pounds of static thrust, which isn't bad compared to almost 3 pounds from a stock 3.5/RK-20 package.

For peak performance, stay tuned!

Rich Uravitch, c/o *Model Airplane News*, 632 Danbury Rd., Wilton, CT 06897.

**The following are the addresses of the people and companies mentioned in this article:*

Jeff Ross, 33 King St., Apt. #2010, Weston, Ontario, Canada M9N 3R7.

Jet Age Model Aircraft Co., 5428 Bushnell, Riverside, CA 92505.

Nick Ziroli Models, 29 Edgar Dr., Smithtown, NY 11787.

Kress Jets Inc., 27 Mill Rd., Lloyd Harbor, NY 11743.

Hobby Lobby International, 1 Franklin Pike Circle, Brentwood, TN 37027. ■

GMP SHUTTLE

(Continued from page 69)

strike and broken landing gear struts. The rotor blades survived the boom strike, but put a crease in the tailboom. I repaired this by finding a wood dowel the size of the inside of the boom. I rounded the end and removed the tailboom from the copter. I then placed the dowel into the rear of the bent boom. I placed the front end of the boom on a piece of wood on the floor and proceeded to drive the wood dowel through the boom. This strengthened the boom and removed most of the crease, and I am now flying this tailboom with no problems.

As to the landing gear struts, they could not be repaired because they are made of hard plastic and broke completely through on both struts. I cut the skids off to a shorter length on a set of Tuff Struts that I had and installed them

on the Shuttle. This made a wider, tougher gear that could be used for a training type for the beginner. If you decide to use the Tuff Strut gear for training, I suggest that you leave them full length. This landing gear is available through hobby shops or from Miniature Aircraft Supply*.

The Shuttle is capable of loops, rolls, and auto rotation landings. The auto rotation gear is stock equipment on the Shuttle, as is collective pitch on the rotor head.

I've just returned from a fun-fly helicopter contest where I flew the Shuttle in the Intermediate class. I came in second and was thoroughly impressed with the performance of the Shuttle. Flyability, stability, simplicity, and affordability best describe the GMP-Hirobo Shuttle. The Shuttle is an outstanding effort by GMP-Hirobo to increase the number of R C helicopter fliers without making them spend large amounts of money or use hours of building time.

The Shuttle comes in a blue colored canopy with a dark smoke windshield. A set of decals is included and can be added to enhance its looks. If you prefer to paint, then any polyurethane paint will do, such as Formula U. I used the decals and painted only the simulated screens and running lights. I then outlined the windshield with striping tape.

I'll stop raving about the Shuttle now and hope that you get the point that it is an extraordinary helicopter in its concept and price.

Grady Howard, c/o *Model Airplane News*, 632 Danbury Rd., Wilton, CT 06897.

**The following are the addresses of the companies mentioned in this article:*

Gorham Model Products, 23961 Craftsman Rd., Calabasas, CA 91302.

Miniature Aircraft Supply, 2594 N. Orange Blossom Tr., Orlando, FL 32804. ■

FROM THE COCKPIT

(Continued from page 45)

2,000, with much of this time being spent in the finishing phases. By the way, the complex masking which always accompanies paint jobs like those on Eagles is greatly simplified by a series of die-cut

(Continued on page 106)

PRODUCT NEWS

KYOSHO SUPER ALTA

The new Kyosho Super Alta 1/12-scale electric race car is the perfect first R/C car for any modeler. Available from Great Planes Model Distributors (P.O. Box 4021, Champaign, IL 61820) the Super Alta features independent front suspension, a rear differential, and handles like a dream. The Super Alta can reach a speed of 30 mph thanks to the high-performance RS-540 motor. Many optional parts are available to "hop-up" the Super Alta, including a variety of Kyosho LeMans electric motors. It requires a two-channel radio and a six-cell battery pack and charger.

FP-S33H MICRO SERVO

Futaba (Futaba Corporation of America, 555 W. Victoria St., Compton, CA 90220) has made the new S33H faster than ever, despite its incredibly small size. Ideal for sailplane applications, the S33H weighs in at just .6 ounce and is only ½ inch wide. With dimensions of 0.50x1.06x1.12 inches, it has a torque of 26.4 and a transit of 0.18 second/60°.

TOP FLITE PROPS

Top Flite Models (2636 S. Wabash Ave., Chicago, IL 60616) is now offering 14x8 and 14x10 maple props, especially suited to .90 and 1.20 four-stroke engines. They come six per package and special features include accurate balancing and a high-luster, fuel-proof finish. They have a true aerodynamic pitch and a highly efficient airfoil for minimal tip flutter and maximum thrust. For more information and the latest catalog, send $2 to Top Flite Models Inc.

COSMO 25 KIT

World Engines (8960 Rossash Ave., Cincinnati, OH 45236) introduces a new trainer, the Cosmo 25. This 25-size shoulder-wing plane features cleanly die-cut wooden parts, notched leading edges for strong, quick built wings, decal sheets, and a lot of hardware. It even comes with a spinner. This is a great flying airplane capable of very slow stable flight for beginners or acrobatic maneuvers for the experienced R/Cer. The Cosmo 25 is slightly bigger than the average trainer with a wingspan of 50.4 inches and a wing area of 450 square inches. The length is 38.4 inches which adds up to a weight of 3½ to 4½ pounds. It requires a four-channel radio and a 20 FSR- to 35-size engine.

ESCAPE

The Escape, a new Bridi design which is a proven winner, is designed for AMA or FAI Turnaround pattern. Features include: foam wing and stab with 3/32-inch balsa sheet covering and fiberglass canopy. The plane also accommodates tricycle or conventional gear, fixed or retractable, rear or side exhaust. Wingspan, 62.5 inches; wing area, 770 square inches; engine, 10cc .90 or 1.20 four-stroke. See you nearest dealer for this kit and also other Bridi Aircraft Design (23625 S. Pineforest Lane, Harbor City, CA 90710-1233) kits and accessories.

JAC-RABBIT

Raco Modelcraft's (1421 E. St. Andrews Pl., Santa Ana, CA 92705) Jac-Rabbit is a car with the size and realistic looks the true off-road R/C enthusiast wants. It's rugged enough for any terrain and will run for a full hour on a tank of gas and a full charge. It features changeable gear ratios, enclosed gear drive, disc brakes, independent suspension with oil-filled shocks, neoprene semi-pneumatic tires, and a fully chromed steel roll cage. The engine is a 1¼ horsepower forced air-cooled two-stroke with solid-state magneto ignition and recoil starting. All you need to supply is your own radio transmitter and receiver—the Jac-Rabbit includes high-load servos.

Descriptions of new products appearing on these pages were derived from press releases supplied by the manufacturers and/or their advertising agencies. The information given here does not constitute endorsement by **Model Airplane News,** or guarantee performance or safety by **M.A.N.** When writing to the manufacturer about any product described here, be sure to mention you read about it in **Model Airplane News.**

HEATHKIT CATALOG

There are over 400 electronic products in kit form (including transmitters and receivers) and assembled versions showcased in the new Heathkit Catalog from the Heath Company (Dept. 150-735, Benton Harbor, MI 49022, USA *or* 1020 Islington Ave., Dept. 3100, Toronto, Ontario M8Z 5Z3, Canada). To receive this colorful catalog free, write to the Heath Company. Free catalogs are also available at over seventy Heath/Zenith Computers & Electronics Centers located in the U.S. and Canada.

GREAT LAKES 2T-1A

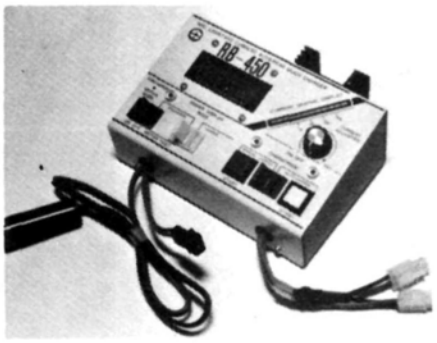
From the Golden Age comes a real classic from Ikon N'wst (P.O. Box 566, Auburn, WA 98071). The 1/8-scale Great Lakes 2T-1A has a 64-inch span and is designed for a range of four-cycle engines .60 to .90. Construction is for the intermediate modeler. The kit is available for $50, plus $5 for shipping, directly from Ikon N'wst or through your local dealer.

"CAP'N EDDY" PILOT BUST

Put some personality in the cockpit! Ace R/C's (116 W. 19th St., P.O. Box 511PR, Higginsville, MO 64037) intrepid mascot, Cap'n Eddy, is now faithfully reproduced in Latex for realism and light weight. He is 1/6-scale which makes his head about 1¼-inch in diameter—perfect for most models from .25 to .60. Gone are the days of boring pilots with no personality—Cap'n Eddy lives!

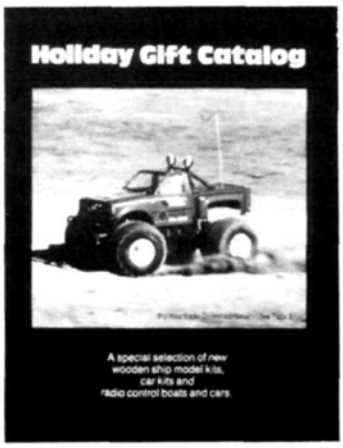
BIG BEAR R/C TRUCK

With a 2-foot wide wheel base and a chassis that rises 2 inches above the ground, the Big Bear from Model Expo (23 Just Rd., Fairfield, NJ 07007) eats rocks and 2-foot drops for breakfast. This monster R/C truck laughs at danger; the Bear has super heavy-duty rear spring suspension and independent coil spring front suspension. A high-powered Mabuchi "Black" RS-480 provides enough torque to tackle any incline or obstacle, and traction is guaranteed by four gigantic semi-pneumatic tires with deep V-shaped treads. Get the Big Bear and find out what real off-road excitement is. To order, write to Model Expo or call toll-free, 1-800-228-2028, ext. 36 (credit card orders only).



RB-450 CHARGER

Model Rectifier Corporation (2500 Woodbridge Ave., Edison, NJ 08817) has consistently offered a full line of chargers and the RB-450 Auto-Peak Quick Charger is the top of the line unit. It features delta-peak charge detection, digital and bar graph displays, a motor test circuit, and compatibility with a range of batteries (4-8 cell). The unit shuts off the charger automatically when the battery pack has reached full capacity. There is a built-in discharge circuit to help equalize all cells and a motor test circuit allows you to check up on your race motor before it's installed into a chassis.



MODEL EXPO CATALOG

Model Expo (23 Just Rd., Fairfield, NJ 07007) has a comprehensive catalog available which includes the newest and best in R/C cars, boats, and accessories. The catalog also includes tools and books for every modeler. It features the Big Bear, the Cox Gallop 4WD S and the Tokyo Marui Hunter. The catalog is available from Model Expo for $1.

FROM THE COCKPIT

(Continued from page 103)

masks which are part of the kit. This explains why so many Eagles have nearly identical paint jobs.

Regardless of the obvious similarities/differences between the Eagle and the Pitts, it's only by way of strapping one on that you find the true differences, which, surprisingly enough, are many.

I trundled down to Aero Sport in St. Augustine, Florida, where Jack Cheek graciously loaned me his Eagle for my first Eagle ride. Having owned an S-2A Pitts for 14 years, I was naturally eager to see how the two stacked up. I was also aware that having owned the Pitts for so long, I was going to have a hard time being partial.

The second I climbed into the saddle the differences began to hit me in the nose. In the first place the wide, plush seat and general cockpit furnishings were a far cry from the Pitts' spartan, submarine way of doing things. Also, when I pulled the canopy shut, it seemed to disappear. The glass just "went away," it was so optically perfect.

Taxiing out I was surprised because I expected the visibility to be drastically better than the Pitts, but it was about the same, even though the glass comes down much farther than on the Pitts. I guess the wider fuselage eats up some of the visibility gains.

Out on the runway, I lined up so the edges of the pavement were equally visible on both sides and started feeding the power in. True to hot biplane tradition, the Eagle started rocketing down the runway and I could feel the spring steel gear waffling back and forth a little when I picked up the tail. The airplane got light on its feet and went flying before I gave the tweak on the stick the Pitts requires to break ground. In that respect, the Pitts seems heavier.

One thing is certain, when climbing away from the runway, even with two people on board, this thing is no sluggard. Sixty seconds after brake release we went through 1,500 feet and I was at least 10 mph over best rate of climb speed. In that area it's at least as good as the Pitts.

With 3,000 feet between me and the inland waterway below, I dropped the nose and watched as the speed immediately jumped to 140 mph. Bringing the nose up, I fed in the ailerons and watched

as Florida cartwheeled around the spinner. Then another. And another. And on and on. In the rolls I found I had to work a little harder because the Eagle is more rudder sensitive than the Pitts and doesn't seem to groove through the roll quite as easily. In slow rolls I had to cross control a little longer past inverted and then transition to the other rudder a little harder. That's neither good nor bad, but it's a difference I hadn't expected.

Sucking the nose up, I glanced out at the left wing tip and watched myself crawl up over on my back and then back down toward the ocean in a loop. It was effortless. Coming out of that I let the nose come up just above the horizon and rolled over on my back, carefully monitoring the altimeter to make sure I held level flight. In that situation, it took just a little more forward pressure than the Pitts, but not enough to worry about.

Rolling right-side-up and slowing to 115 mph with the nose slightly high, I yanked the stick back and into the corner at the same time stomping the right rudder to the floor. Bam! The airplane responded by instantly stalling and whipping around its axis in a snap roll. As we went around I could feel the tail moving around behind me, buffeting as though the elevator was trying to stall. A lot of airplanes do that and they require that you initiate the maneuver with a lot of elevator but immediately back off just a little to keep the tail flying. The Eagle was one of those. The Pitts requires you to lead with the rudder and it won't snap to the left and it takes a lot of technique to make them clean. The Eagle needs technique too but it's a shade different. Also, the Eagle seems to go around a little slower, but it's still lightning fast.

I flopped and slopped around and finally decided that like all airplanes, you have to fly it longer than I was going to be able to, if you were going to master it. However, I did decide a basic difference is that somehow the Pitts feels "denser" (not my term). Whatever the Pitts does is just a shade sharper. But, once I've flown an Eagle as long as I have a Pitts, I might feel the same way about that bird.

Landing, of course, was still ahead of me. As I turned final, I received two definite surprises. The first was that the airplane was so clean that it was going to glide right past the numbers where my trusty Pitts wouldn't have even made the airport. The second was that the Eagle was at least as blind as the Pitts. The nose and fuselage covered everything and I do mean everything!

My first landing was awful! I rounded out high and had to nurse it down to the runway with power. The second was better but, as I had been warned, I got the tailwheel first because the airplane sits so flat on its gear that you can't really hold it off in a full stall. At least with my lack of experience in it I couldn't do it. My third landing was the best, but it was still a tailwheel-first arrival, which, I'm told, is usual in the airplane.

On roll-out the Eagle showed how civilized it could be. The soft gear absorbed any bounce, making my abrupt arrivals appear silky and we tracked nearly straight ahead with only minimal input from me. This was a far departure from my Pitts in which you skip and hop around the runway, constantly watching for the airplane to head for the bushes.

So how do they stack up? Like blondes and brunettes! They may be different but they're both fun. ■

SOARING NEWS

(Continued from page 99)

Software for Soaring

Hans-Dieter Konig read the article about soaring software in last April's *M.A.N.* and decided to write us about that, and also include a bit about himself. Hans says that he likes "Soaring News," but wishes to pass on a correction to the Richard Drury article about the Wasserkuppe. He says that in the photo of the ASW-22, the oxygen bottles were not oxygen flasks at all, but, instead, capacities for the variometer(s) and/or altimeter. Breathing oxygen bottles are normally lashed down aft of the main spar-fuselage connection, and are not visible in the photo.

Hans also mentioned that he has been involved in computer software design for years, and that he has a great interest in this subject. He has designed some performance-related programs for full-size aircraft, and tinkers with them for amusement.

Hans' father was one of the German soaring pioneers, and that interest must have rubbed off because Hans says that he has been around sailplanes, pilots, and soaring for as long as he can remember. He attributes his graduation from free flight to R/C soaring to this influence and says that when the local pilots of the full-size sailplanes find poor soaring conditions, they immediately bring out their R/C sailplanes for an afternoon of fun. Hans concludes that a background in modeling is a tremendous advantage in understanding and applying this knowledge to the skills required for flying full-scale machines.

Hans has pursued soaring by acting as Chief Flying Instructor at the Cu Nim Gliding Club of Calgary, Alberta, for three years and also assists with the tow-pilot duties, flying Bellanca Scouts and Citabrias. He owns a half-interest in a Schempp-Hirth 15-meter Mini Nimbus with which he competes regionally and nationally.

His stable of models consists of Expresso, a 160-inch span of original design about 10 years old; two Hobie Hawks; another Sagitta 900 still in kit form; and several power models. Hans also has his original R/C model, an Aero 7, built when he was 13 or 14, and used with escapements on single-channel carrier radio. It's still in flyable condition, although it has been modified many times for various R/C installations.

Hans plans a wing-twist control system for the Sagitta 900, as soon as he finds the time to build it! No wonder—he's a busy man!

I appreciate Hans-Dieter Konig's correspondence, and hope that he will write when that wing-twist Sagitta 900 is finished. We'd all like to see that one fly. It oughta be a winner.

Decals Wanted

On behalf of the Central Ontario Glider Group, Jack Nunn* is assembling a collection of decals of R/C soaring clubs from all over the world. These will be displayed at club functions, mall shows, and other public events.

Should your club have a decal, I will be pleased to exchange it for a C.O.G.G. decal, and add yours to our collection. Should you know of another club that can help, please pass on this request to them. I will exchange, one-to-one, any decals received.

Many thanks for your cooperation and good soaring!

See you next month.

Jim Gray, c/o *Model Airplane News*, 632 Danbury Rd., Wilton, CT 06897.

**The following are the addresses of the person and company mentioned in this article:*

Dodgson Designs, 2904 SW Camano Dr., Camano Island, WA 98292.

Jack Nunn, RR#1, Midhurst, Ontario, Canada L0L 1X0. ■

R/C NEWS

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Frankly, I would be willing to turn control of this crazy world over to modelers. In a very short time the level of understanding between nations would increase one thousand fold. Indeed, all disputes could be settled with a contest—winner take all for that year. Oh well, it's my fantasy! In any event, don't miss one of our hobby's greatest pleasures. Get to know as many modelers as possible. You'll be better for the experience.

Things Used and Liked

Altech* has a new electric airplane, the Cessna Skyhawk 172. This is a finely-molded, all-foam airplane for electric power with a 3-to-1 geared motor and a 9x4 propeller. The airplane spans 43 inches and has a length of 30 inches; all

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R/C NEWS

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with a weight of about 2 pounds. It comes in a complete kit with all aircraft components sporting a relatively hard, smooth surface, motor, gear case, propeller, hinged surfaces, pushrods, power harness, all hardware, and beautiful vinyl markings. All you need are a 6V battery and a 2-channel radio. And believe me, it takes no more than a few hours to make this machine ready for flight. Flight is what it's all about and Altech's latest effort gives plenty of that. The Cessna 172 is easy to fly, capable of basic maneuvers, and ideal for those who wish to enter electric flying without expending a lot of workshop time.

Sheldon's Hobby Shop* has two new cyanoacrylate glues, a gap-filling and a super thin formula. These glues are called "Posi-Cure" and both have proven to be very effective adhesives in my workshop. They all have the inherent advantages of cyanoacrylate adhesives (rapid cure, strength, and ease of use) that we have all come to appreciate over the last several years. Both glues come in 1-ounce containers with a clog-resistant spout and stopper.

Radio Shack (those stores are everywhere) has a Micronta LCD Digital multimeter that really helps if you're into electric flying or off-road vehicles. Sold as catalog number 22-193 at under $80, the meter is automatic in its ranges and really gives you insight into battery voltage, charging, and condition. The meter reads 200 mV, 2-20-200 and 2,000 volts, 200-mA to 10A and 200 ohms to 2,000K. It is useful for AC and DC current but is, of course, most useful in our DC world. The meter can also check diodes and circuit continuity. I've found this meter to be very accurate and sensitive (perfect for detecting peak charge) and most useful in charge and discharge functions for battery packs used on electric cars and airplanes.

Life Can Surely Humble One

Some months ago I visited a flying field and the action there was a joy to watch. That is until a young (everyone is young these days!) modeler came up to say hello and to ask, "Didn't you used to be Art Schroeder?" Try that one on for size. I hope to see you at the flying field but don't ask if I "used" to be I still am!

"Still" Art Schroeder, c o *Model Airplane News*, 632 Danbury Rd., Wilton, CT 06897.

**The following are the addresses of the companies mentioned in this article:*

Altech Marketing Inc., P.O. Box 286, Fords, NJ 08863.

Sheldon's Hobby Shop, 3157 Alum Rock Ave., San Jose, CA 95127. ■

FIREHAWK

(Continued from page 44)

triangle. Position the elevator and rudder cable outer housings on the fuselage sides. (Note routing of the cables on the plan side view.) Zap the outer housing in place. Hint: the cable housing will better follow a curve if the outer housing is heated with a MonoKote heat gun and allowed to cool. The cable should also be pre-shaped over a coffee can or a table edge.

Temporarily install the fuselage sides to the fuselage module with masking tape on a flat surface. Check the fit of the assembly using F5 as a reference. Align and adjust as necessary to get both sides and all formers square with each other and a flat surface. When everything is true, Zap together the module, the fuselage sides, and the servo tray. (Note: prior to Zaping, check root rib placement accuracy with 11/32-inch tubing.)

Install the nose block (place the fuselage over the top view). Mark the centerline on the formers and check alignment. Check the fit of F1 and the alignment of the 3/4x3/4x10-inch pine blocks. Trim and fit as necessary. Zap F1 and the nose block in place. Zap F8 in place and temporarily put the fuselage aside.

The only unusual thing about the rudder is that the rudder post is assembled in layers, to form pockets for the Klet aileron hinges. Use firm balsa for the rudder post and light balsa for the rest of the rudder. After the rudder is complete and dry, remove it from the plans. Take the fuselage sides and temporarily install 11/32-inch tubing in the wing root hole.

Install 1 3/4x1/8-inch tubing in the stab hinge hole on the rudder, exactly square to the rudder surface, both vertically and horizontally. Block up the fuselage so that the 11/32-inch tubing is exactly level to the building board. Temporarily install a spacer at the rear fuselage bottom. Slip the rudder in place. Guide the stab cable housing and cable in place as per the plans. Put a 3/32x6-inch wire through the stab hinge tubing and block the rudder up so that it's square and in the same plane as the 11/32-inch wing tubing. Zap the rudder in place.

While the fuselage is still in the jig, install the top 1/4-inch rear deck. After the glue dries, remove the fuselage and install the antenna guide tubing (Sullivan red outer tubing). Install the front bottom 1/4-inch sheeting. Replace the fuselage back in the jig and recheck that the fuselage is still square and that the 11/32-inch wing tubing still lines up with the 3/32-inch wire installed in the rudder stabilizer hinge tubing. Trim and fit the front fuselage bottom sheeting to allow the installation of the 3/4x3/4x10-inch pine blocks. Install the rear bottom 1/4-inch balsa sheeting. Install the bottom 1/16-inch ply sheeting as noted on the plan side view. After the glue is dry, rough-sand the top and bottom sheeting to shape.

Tack in place canopy formers C1, C2, and C3, and the fasteners as per the plan side and top views. After checking the fit, add scrap balsa to build up the canopy. (Note: if a sniffler is to be used, build an enclosure for it.) Use scrap balsa for the remainder of the canopy and sand to shape. Do not final-sand the rear of the canopy at this time.

Construct the removable top of the fuselage using spruce and balsa. Position the top in place. Install the Goldberg* hatch hold-downs as per the plans and sand the canopy rear and the fuselage top to shape. Finish shaping the fuselage. Use Super Shrink Coverite* for the rear of the fuselage and K&B* fiberglass cloth for the front. Glass the entire

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FIREHAWK

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fuselage, sand, and finish.

The stabilizer construction is standard. The only exception is the hinge tube, which is designed to be a tube within a tube with a 3/32-inch wire pin in the center. The 1/8-inch brass tubing extends 1/2 inch from either side of the rudder and fits into mating 5/32-inch tubing in the stabilizer. The 5/32-inch wheel collars are used to lock the stabilizer in place for flight.

The second difference is in the spar. It's a composite of 1/8x1/2-inch balsa and spruce. The spruce is pre-tapered from 1/2-inch at the root to 1/4-inch at the tip. After the stabilizer is finished and lifted from the plans, sand to shape as per the cutaway views on the plans and taper from the root to the tip using the pre-tapered spruce spar as a guide. Sanding of the stabilizer is made easy if you use a piece of coarse sandpaper tacked to the work table. Sand the stabilizer halves on the sandpaper. Prior to covering, final-sand with 600-grit wet-or-dry sandpaper.

Assemble the spars in a jig. For a gentle, forgiving, stable aircraft, set the wing rod angle to 4 1/4° each wing for a total of 9°. For better aileron response (flatter turns) and less rudder coupling, set the wing rod angle to 4° for a total dihedral angle of 8°. Thoroughly wax the jig with Johnson Paste Wax before each use. Make sure you lay up a left and a right spar.

Position a leading and a trailing edge in place. Don't weaken the spruce by pinning through the wood. Pin the spar in place over the plans (pin on either side but not through the spruce). Starting with W1, glue in ribs W1 through W4 up to the spoiler torque horn position. Insert the spoiler torque tube assembly through the rear holes in the ribs. Continue installing ribs W4 through W5 and shear webs through W5. Insert the aileron torque tube assembly through the front hole in the ribs. Note: install a spruce splice at the front of rib W5. Continue gluing in ribs W6 through W14. Glue in the remaining gussets, shear webs, etc.

Construct the bottom sheeting by splicing 1/16x3x48-inch sheets to form a 1/16x8 1/2x65-inch sheet. Sand both sides smooth. Lay the bottom wing skin on a flat surface. Lay the wing skeleton on the bottom sheeting, making sure the splices that extend the 48-inch sheets are on the outboard side of the wing. Center the

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FIREHAWK

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wing skeleton on the sheeting and Zap the wing to the skin from the spar to the trailing edge.

Block up the leading edge, making sure the wing remains flat from the spar to the trailing edge. Zap the forward sheeting in place. Complete the spoiler and aileron torque rod installation. Take care that the bearings are lined up and don't bind.

Trim the bottom sheeting flush with the leading and trailing edges.

Construct the flaps by laying down 1/16x2¼-inch sheeting for the bottom surface. The leading edge is formed with 3/16-inch square medium-hard balsa and 3/32-inch ribs. Sand the assembly in place. (Note: a T-bar with coarse sandpaper makes the job easy.) Feather the trailing edge of both the flap and the aileron.

Modify a ½A control horn and Zap in place on the aileron as shown. Sheet the upper surface of the aileron with light 1/16-inch balsa. Note the ¼-inch ribs and plywood on the inboard edge of the flap. Prior to Zaping the plywood in place, insert a piece of 3/32-inch i.d. rectangular brass in place as shown. Sheet the upper surface of the flap with light balsa.

Assemble the aileron pushrod from two solder clevises and 1/16-inch wire. Make both pushrods exactly the same

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length. Install the pushrod on the aileron torque rod horn and check for freedom of action. Correct any problems now.

Make two spoiler actuator rods from threaded rod and two nylon clevises. Install on the spoiler torque rod horn.

Sheet the upper surface of the wing with light contest-weight balsa. Make sure the wing stays flat. Once a warp is built in, it's almost impossible to take out. Cut the opening for the spoiler. Make a spoiler blade from hard trailing edge stock. Cut down a ½A control horn and install on the spoiler blade in the position shown. Outline the spoiler opening with masking tape and sand the upper surface of the spoiler blade to the upper airfoil shape.

Mate the wing to the fuselage. Shim the plywood root rib as necessary to get a good fit from wing to fuselage. Glue the root rib in place. Finish sanding the entire plane and paint or MonoKote.

Install the radio gear. I used an Airtronics* 7-channel radio. I've flown the Airtronics radios for several contest seasons and highly recommend them. In fact, Airtronics has only one of a few radios on the market that can be used for a multi-function sailplane that requires reflexing the flaps. Both the flaps and the ailerons require powerful servos; don't try to use smaller than 72-inch servos for these functions. Smaller servos can stall at best but will definitely strip gears. Besides, why use lead as nose weight when the servos do a better job (2 ounces each) and serve a useful purpose. A 1,200 mAh battery pack is also a must. I've flown the plane for just under two hours and would hate to run out of power.

FLYING. This is the best part! Be very particular about the CG on this plane. A 205 airfoil has a rather narrow CG range. Too far forward, and turns will tuck into the center; too far aft, and the controls will be too sensitive. It's best to start with a CG that's at the 35% point of the wing measured from the leading edge. The best thermalling CG is at the 36-37% point as measured from the leading edge. The flaps should be exactly flat as measured along the bottom surface of the wing. All other control surfaces should be faired.

Do a few firm hand launches to check if everything is okay for a winch launch. Have somebody else handle the winch while you worry about the plane. The Firehawk is hard to tip-stall, but does require a good firm launch. The wings

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FIREHAWK

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are quite strong but a zoom launch is not necessary. If you use a little extra speed on the top of the launch, it will climb out for another 50 feet or more.

Now that the first flight is out of the way, it's time to trim the Firehawk. To confirm CG and stab decalage, put the Firehawk in a 40° dive and pick up speed. Five to six seconds of dive is enough. Ease the stick back to neutral and watch the plane. If it starts to tuck more, positive stab (up) is required; if it pulls up sharply, more negative (down) stab is required. Adjust as necessary via elevator trim to get the plane to slowly pull the nose up after the stick is neutralized. Do not alter the CG during the above tests. The CG is right on the money if the plane will turn smoothly with no tendency to tuck the nose into the turn. If the nose wants to dive into the turn, take a little nose weight out (about a ¼ ounce) and try again. If the decalage is correct per the above steps and the plane oscillates about the pitch axis, then add a little nose weight and check the turn for nose tuck.

Landings are very easy if you develop the habit of the downwind leg, crosswind leg, and the final. Just prior to entering the downwind leg, add about 10° of flap to start to slow the Firehawk. Upon entering the downwind leg, add a little down trim. Make no other changes until the final, then add another 10° of flap (total 20). If the wind is 10 miles or less when you cross the end of the tape, add full flaps and spoiler at 12 feet or so from the center of the tape. The Firehawk will almost come to a halt with full flaps and spoiler just before touchdown. A little practice and the high point landing will become routine.

Like I said at the beginning of the article, I love flying this plane. It would please me to no end to compete against another Firehawk on the ESL circuit. Let me know how you like your Firehawk.

**The following are the addresses of the companies mentioned in this article:*

Pacer Technology & Resources, 1600 Dell Ave., Campbell, CA 95008.

Sullivan Products Inc., 533 Davisville Rd., P.O. Box C, Willow Grove, PA 19090-0903.

Carl Goldberg Models Inc., 4733 W. Chicago Ave., Chicago, IL 60651.

Coverite, 420 Babylon Rd., Horsham, PA 19044.

K&B Manufacturing, 12152 Woodruff Ave., Downey, CA 90241.

Airtronics, 11 Autry, Irvine, CA 92718. ■

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ative. As each cell came down the line, the assembler put the positive plates, the cellophane separators (insulators) and the negative plates in the case. Then, with a hypodermic syringe, a measured amount of electrolyte was injected into the case. This amount was only enough to exactly saturate the sintered nickel oxide plate material. There is no excess electrolyte to spill. Thus, they are referred to as 'starved electrolyte cells.' Full-size aircraft do, however, use wet-cell nickel-cadmium cells that have large amounts of excess electrolyte.

"For these reasons, the sealed cells shouldn't be permitted to overheat by overcharging. As you mentioned, electrolyte will boil and build up pressure, which is vented off. There's no excess electrolyte to replace what is lost, so cell capacity is degraded. Also, the cellophane separator material can be damaged by temperatures above about 140° F, which is just above tolerable temperature for skin. This damage can lead to preforations, which allow metallic particles from the plates to create a short circuit between them, causing a 'dead cell' that will not take a charge.

"Thanks for giving me your ear—I hope I didn't chew it off."

Thanks for the chewing, Bob. It just goes to show that columnists are not always experts on all subjects. Not being a chemist, "acid" to me is kind of a catch word for "dangerous" or "corrosive." I'll know better next time. Also, my own experience was with some GE cells that were doing a lot of spitting, kind of like the acid of acid-core solder, forming a kind of fine mist in the fuselage of my model. Further, I've had cells that have "leaked" into my fuselage, leaving a stain in the battery area—this is why I referred to "spilling," which was a bad term.

The second letter comes from John P. Foley of Eugene, Oregon. John's experience with an electric Sensoar glider (from Hobby Horn*) is interesting from the aspect of kit quality. It also hits on a point that's important for all beginning fliers, whether they are flying an electric model or not. While John's experience is by no means unique, I believe it needs to be brought out over and over again:

"After fifty years or so I decided, at the urging of my son and some friends, to build a radio-controlled model plane. My previous experience had been in the early 1930s with the old stick-and-tissue models. It was quite by chance that I picked the Sensoar kit and I'm glad I did. The kit is well planned, the pieces are all cut out, and the instructions are very good. My friends are quite envious, as they had opted for other kits costing more and that were not nearly as good.

"The plane went together easily—after I learned how to handle the new adhesives. I only glued my fingers together a few times.

"I deviated somewhat from the plans on the location of goodies that go inside. Because I'm an old beer drinker, the motor batteries are arranged in a six pack. Motor switches and servos are up front, and aft of F2 are the motor batteries. The receiver and its batteries are just forward of F3 and the control surface servos. The radio is a Futaba FP-4L with micro receiver and servos. Weight is about 39 ounces.

"Ignoring the advice in the instructions, I went out by myself for a trial flight. The day was windy, but I decided to try anyway. The plane made an arcing climb to the right. It kept right on around and when it came back by me it was starting down. I gave it up-elevator and since it was already banked to the right, the turn only got steeper and it smashed to the ground. The flight lasted only a few seconds. The motor batteries came through bulkhead F2 and took everything with them. The only damage other than to balsa was a broken microswitch. All was repaired the next evening.

"The second outing was much better. I took along a friend who knew how to fly radio-controlled planes. We made five or six nice flights and he gave me the controls after the plane was way up in the air. When I got into trouble, I handed him the transmitter and said, 'Do something.'

"On outing number three my friend was not available, but my son was and he wanted to see the plane fly. The launch was successful and the plane climbed nicely. After a couple hundred feet out, I decided to turn back toward us. Here everything went to pot and the plane finally dove into the ground. The damage was mostly to the fuselage, with the sides split and the rudder knocked loose. Still, I had it all repaired in one hour.

"All in all, if I continue to follow the

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BYRON ZERO

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When joining the two fuselage halves, have both wing and stab in place to permit accurate, head-on alignment of these surfaces.

The Zero will use lots of masking tape; it's one of the best ways to hold things together on this project.

The landing gear is a most enjoyable assembly task. Simply sit down, turn on the TV, and have at it with the supplied drawing in front of you. It goes together beautifully and the final results are as realistic as modeling gets. The upper molded strut must be trimmed by approximately ½-inch to permit clean retraction into the aircraft wheel wells.

Once the retract wheel is installed, don't play with it. It's possible to pop the centering spring if the wheel is twisted too far. Believe me, it's a pain to get the gear out of its place after the fact—I know, I did it!

I used Conap Easypoxy to set rails and plywood scabs in place, principally because this material doesn't have a tendency to run after it's applied. I used Formula II Hobbypoxy* to fiberglass formers in place with strips of cloth.

Sanding fiberglass parts should be done carefully to avoid destroying the very effective panel lines molded into the fuselage and cowl.

A variety of engines will power the Zero, including the Quadra 50, Sachs-Dolmer 3.1, 3.4, or 3.7, and the Quadra 82—the engine of my choice. The airplane has a fairly short nose moment so any weight saved with a light engine will probably be made up in lead. The Q-82 (5 cubic inches of power) proved just right since my Zero doesn't have an ounce of deadweight.

Any rails or scabs you epoxy into the fuselage must be reinforced with cloth if you expect things to remain in place. I recommend a thinner, long-hardening epoxy for these operations. Five-minute epoxy simply didn't work well.

After the wing and stabilizer are tightened in place and all is well, remove them. The setscrews will leave a mark on the aluminum spars and I suggest you file a notch at this point equal to the width of the screw; you need only go to a depth of 1/16 inch. This procedure will guarantee that surfaces won't creep out of place since the screw will now be in this tiny notch.

I used silicone rubber to set hinges into place. Epoxy is okay, but silicone is a guarantee against any hinge binding and

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BYRON ZERO

(Continued from page 122)

it holds just as well.

Please, if your Zero kit contains 2:56 hardware, change it to 4:40 hardware. I understand that all kits now contain this change. The 2:56 simply is not sturdy enough to handle the air loads that will be encountered.

The only real change I made was the installation of steel cables to drive the rudder. I initially installed the plastic pushrods included in Byron's kit, but I found I couldn't adjust things to a positive neutral. Mu solution was to cut the outer sheathing just forward of the stabilizer with replacement of the inner rods with plastic-coated steel wire and Du-Bro* rigging fittings, clevises, and ball links. This change gave me a very clean rudder centering and I highly recommend it.

No report on the Byron Zero would be complete without comment on its superior polyester fiberglass fuselage. These units are highly detailed with panel lines, inspection panels, and other full-scale features. Even so, they are extremely light; I've had "60" pattern airplane fiberglass fuselages that weighed more. The light weight is clearly not at compromise with strength, since the Byron warbird series has been shown by many (some of my friends are not the best at piloting) to be able to handle all flight loads and most of the knocks and bangs to which model aircraft fall heir. There were very few pin holes and those that did exist were easily handled with primer coats of K&B Superpoxy. Any stubborn pin holes were cured by spatula-applied bits of thick primer.

The Byron warbird fuselage weight must stem from the handwork involved. All fuselages are layed up in molds by hand, which allows full control of resin and cloth. They are cured for some considerable period of time before packaging. In this day of products that are not equal to their advertising, it's refreshing to find some real quality control—such is true of Byron kits.

After completing all steps in assembling the Zero, I was confronted with finishing procedures. In a telephone conversation with Bruce Godberson of Byron, I suggested that I would like to try one of the heat-shrink cloth materials such as Colortex. Bruce reported that someone had previously done the foam surfaces with such material and he seemed to think it was worth a try. In short order, some test pieces (actually tail surfaces from a P-47) were delivered. My

first efforts were a disaster. Little shrink and even less adhesion—it all looked hopeless. I had tried the material at its lowest tacking heat (about 210°), not much above the heat needed for Econo-Kote. I was certainly willing to use EconoKote since I had fine results on previous Byro-Foam surfaces with that product. However, I was looking for another way to go since I did plan on a paint finish. Since I knew that too little heat was the problem, I raised my iron to MonoKote levels (about 350°). I was, after all, working on test pieces.

Fully expecting to turn the foam into liquid, I attacked the job and, surprisingly, it all worked. I ended up with foam surfaces smoothly covered with cloth, with no bubbles, no foam damage, and an overall surface less vulnerable than a plastic-covered one. Although the Colortex/foam surface was not quite as good as fiberglass, it was one that took K&B Superpoxy well and one that was slightly lighter than a full fiberglassing job. I recommend heat-shrink fabrics for application to foam (apparently the cloth protects the foam as it's applied), particularly if your fiberglassing skills are as poor as mine.

The entire airplane received two coats of K&B primer followed by a final sanding and two coats of green and grey paint. Painting was done by Doss Steed and the results were very effective. The vinyl appliques included in Byron's kit were used and they really set things off. After the markings were applied, a coat of semi-matt clear was applied to reach the right level of gloss of the full-size Zero.

A minor attempt at "weathering" was done by simply hitting some panel lines and markings with a piece of wet-or-dry sandpaper to allow the white undercoating to show as thin irregular lines. It looks particularly effective around the various inspection panels. Such a procedure would be much better if an undercoat of aluminum had been applied before the color coats.

Power for this test Zero was a Quadra 82; 7.9 pounds of pure power. This engine included Byron modifications to permit direct mounting to the Zero front formers. The mounting system was similar to the Purr-Power mounting but didn't include that system's muffling chamber. The engine also included an automatic spark/throttle advance with electronic ignition by C.H. Electronics*. The spark across the plug gap with this arrangement has to be seen to be believed. It all made for an easily-started, powerful package that could turn the sensational 23-inch, 3-bladed propeller offered by Byron. This engine/prop combination provided all the thrust needed for this airplane. Although the engine seemed heavy at first glance, when installed, it gave almost perfect balance to the Zero with its relatively short nose moment. I can say one thing, I've never seen an easier starting giant-scale engine than this Q-82 modified by the folks at Byron.

Radio control chores were handled by my 10-year-old Kraft Signature. All servos were KP-15s; there seemed to be no need for super-power servos or doubling of the servos. If I could do the project over, I probably would opt for dual-servo arrangement on elevator (as is already suggested for aileron) for my Zero. But all flight tests didn't indicate this to be necessary. My feeling comes only from the redundancy such an arrangement would provide.

FLYING. Flight tests posed no real

BYRON ZERO

(Continued from page 125)

problems although there were a couple of false starts. These were due to some of the hardware that came loose—a few of those nuts and bolts I didn't Loctite. One must be very fussy with any airplane this large and with this much power. Although the Q-82 is as smooth as most big chainsaw engines, it does provide a goodly dose of vibration—anything with 5 cubes will! Because vibration is a fact of life, be sure hinges are securely glued in place, that every clevis has a safety closure, and that every nut and bolt is fully tightened and has a bit of locking fluid. Wood screws should be set in place with a drop of epoxy on their threads (such a procedure makes them harder to remove but you can count on them not vibrating loose). Just as surely, isolate the fuel tank with at least a ½-inch layer of foam rubber to avoid any fuel foaming.

In any event, after correcting those minor flaws, the first flight went beautifully! The landing gear's wide spread made for a very nice takeoff run with just a touch of right rudder needed. The tail came up after a run of 20 feet or so and 100 feet later, the big green bird broke ground so smoothly it was hard to tell when that happened. After a few minutes to give time for those "knocking knees" to quiet down, I tried a few basic maneuvers—loops and rolls. The Byron Zero responded beautifully with no indication of the weight those wings were carrying. This isn't intended to be a pattern airplane; but it does match the full-scale machine's ability to maneuver in a "dog fight." The big Q-82, coupled with Byron's 3-bladed prop, gives a remarkable climb rate and plenty of speed. I frankly felt the airplane's flight realism was outstanding; bring in the Corsair!

The only flight problem was a tendency for the gear to extend slightly from its retracted position in high-speed turns or at the bottom of loops. Byron Originals is now including an all-metal cylinder on the main retracts that provides a 100% increase in retract power to eliminate this problem.

After 10 minutes of flight (it seemed like so much more), I climbed to altitude to feel out the flaps preparatory to landing. A slight nose pitch was apparent, as well as a sharp speed decrease, but the Zero didn't get "stupid." Ailerons and elevators remained effective so I was

ready for landing (by the way, my flaps were set at about 45° full down). The landing itself was uneventful, clean, neat, and, surprisingly, quite slow.

All in all, Byron's Zero is another fine achievement. It builds from a kit of finely finished parts and delivers all the flight performance one would expect from a replica of a front line WW II fighter. The Quadra 82 is a fine addition to the giant-scale powerplant field; it starts easily and runs powerfully. The 3-bladed prop I used is most realistic (it's nice to have a scale airplane where it isn't necessary to change props—one for looks and one for flight), and it provides great performance. The ignition system by C.H. Electronics performed flawlessly. I must say, this was a project I truly enjoyed—one that delivered as much satisfaction as anything I've done in modeling. The Byron warbirds are outstanding and the Zero equals all its adversaries. Give one a try, you'll never regret the decision.

**The following are the addresses of the companies mentioned in this article:*

Byron Originals, P.O. Box 279, Ida Grove, IA 51445.

Pacer Technology & Resources, 1600 Dell Ave., Campbell, CA 95008.

Hobbypoxy, c/o Pettit Paint Co., P.O. Box 378, 36 Pine St., Rockaway, NJ 07866.

Du-Bro, 480 Bonner Rd., Wauconda, IL 60084.

C.H. Electronics Inc., Box 1732, Riverton, WY 82501. ■

WATTS UP?

(Continued from page 121)

pattern of the second outing, I will learn to fly. I know that electric is an ideal way to start (with help), and an electric Sensoar is a great choice. Everyone should give it a go."

Thanks, John. Thanks for the good object lesson for the beginning R/C flier.

D.U.S.T. Contest News

The Desert Union of Soaring Thermalists (D.U.S.T.) of Palm Desert, California, is sponsoring a one-design sailplane contest featuring the new two-meter Gnome. The Gnome features a modified Eppler 205 airfoil and is designed by local pilot John Lupperger.

The contest will be held on April 6, 1986, at 9:30 a.m. Kits and contest registration are $27.50 plus $2.50 for postage. Entry fee without kits is $7.50 until March 6, then $10.00. An AMA card is required to enter the contest.

For more information, contact Phil Johnson*, D.U.S.T. vice-president.

Bob Sliff, c/o *Model Airplane News*, 632 Danbury Rd., Wilton, CT 06897.

**The following are the addresses of the people and companies mentioned in this article:*

World Engines, 8960 Rossash Ave., Cincinnati, OH 45236.

Astro Flight, Inc., 13311 Beach Ave., Venice, CA 90292.

Hobby Horn, P.O. Box 3004, Seal Beach, CA 90740.

Phil Johnson (D.U.S.T.), 1900 S. Palm Canyon Dr., Apt. 36, Palm Springs, CA 92262; 619-327-7980. ■

BIG SHOOT-OUT

(Continued from page 79)

pipes have a history of being more powerful than any other setup, but these engines are not used in your average sport model.

BIG SHOOT-OUT

You'll probably notice that not all of the .60 engines are listed. Unfortunately, some manufacturers will not allow their products to be tested against their competitors. This is a bit unfair since some claim to have more power than their counterparts, yet without any proof, how much weight can you place on such a claim? You have to be the judge of that one!

The propellers used in these tests were the Top Flite 12x8, the Rev-Up 11x7½, and the Max-Dailey 11x10. They were stock props and the pitch and balance were checked for accuracy prior to running. The Top Flite prop was accurate at all stations, as was the Max-Dailey. The Rev-Up, although marked at 11x7½, was found to be slightly less, about 11x7¼.

I used two tachometers, the Tower Digital Mini-Tach and the Royal Tach. The Tower version uses a digital readout display and the Royal Tach uses a balanced needle on a non-linear, multi-selectable scale. By the way, the Tower Mini-Tach also has the capability to read three-bladed props. Both tachs were calibrated and found to be within .01% of each other on readings.

The glowplugs used for the tests were those that were provided with the engines by the manufacturer. If a glowplug was not included with the engine, I used the O.S. No. 8 plug.

You'll probably notice the comparative low thrust readings with the Max-Dailey 11x10 prop. As I mentioned before, a prop is only going to do its thing while it's moving through the air. These figures can only be used for comparison between engines and not between the performance figures of the other props. If I had a torque reading capability, the figures would have more meaning.

It's also necessary to point out that the engines, having different porting, carburetion, and head designs, necessitate a separation of them into categories of Schnuerle and non-Schnuerle. While the HB 61 Blitz is a non-Schnuerle-ported engine, it does have the benefit of PDP (Perry Directional Porting), and according to John Perry, has the capability to out-run, or at least keep up with, the best of the Schnuerle-style engines. His point is proven in the test figures.

All of the engines were run using only exhaust pressure to the fuel tank except for the YS 60, which has a fuel pump and regulator built into the engine. This feature no doubt was the cause for its great performance since the intake volume is so much greater. But even at that, the Fox Eagle III out-gunned it on the Max-Dailey 11x10. If the Fox engine had the benefit of a pump and a larger intake volume, I seriously doubt if there would be an engine that could match it.

A very strong engine was found in the Webra Speed .61. This engine apparently likes the larger props because it was right up there with the Fox and the YS. The Rossi, OPS, HP 61 Gold Cup, ST S61 ABC, and Como 61 were all rather close to each other. A real surprise was found in the Picco 61 RCSE. For a very moderately priced engine, this is a real horse.

The little ST 60 was a real charmer. I say "little" because it's a straight engine without pumps, sophisticated porting, or so-called "state-of-the-art" designs, yet was right in there swinging. It's an old design yet will work its heart out for you on an Aeromaster or Kaos. It was extremely gentle to start, and had an idle that rivals any of the screamers.

I might mention that when I buy any new engine, I always pull the head, carb, and backplate to check for any metal or foreign matter before I attempt to run it. In any production facility where items are being mass-produced and assembled, the chance that something is overlooked is entirely possible. More times than not, they were all clean. I did the same with the engines for this test, and all were antiseptic except one, the OPS. Had I not done this preliminary check, the engine would have been ruined, as I found steel shavings in the ports and aluminum flashing in the carburetor mount. This is just a bit of advice that could save you some headaches.

The only other problem I encountered was with the Irvine .61, which is a very nice engine made in England. When I mounted the prop and tightened the prop nut, the engine locked up and it couldn't be turned over. I called Great Planes Model Distributors and they sent me another beveled shaft collar and a thrust washer, as I thought that might be the problem. It wasn't, so I returned the engine in exchange for another. This one gave me no difficulty and performed

admirably for the tests.

The point here is that any product can have a defect. It's the policy of the company that can help or hinder the situation. In the case of Great Planes Model Distributors, they were not only quick to respond to the problem with the Irvine .61, they supplied quite a few engines for test.

Also quite generous in their help for this article were Circus Hobbies, Hobby Lobby International, K&B Manufacturing, Hand-Crafted Props, Fox Manufacturing, John Perry, Golden Gate Hobbies, World Engines, and Shamrock Competition Imports, Inc.

So, after all of this, who is the big winner? Like I said before, it's you. This hobby can take pride in the products we enjoy, and it's the manufacturers and suppliers of these products that we can give thanks to for the enjoyment we receive out of using them.

The boss is back in the form of a .60 model airplane, boat, or helicopter two-stroke engine that will be around for a long, long time. Long live the "Boss."

The following companies provided engines and accessories for this test:

Props, *Top Flite Models Inc., 2635 S. Wabash Ave., Chicago, IL 60616.*

Props, *Max-Dailey Props, #3 Parisian Ct., Paris, IL 61944.*

HB 61 Blitz, *Perry Aeromotive Inc., 1568 Osage St., San Marcos, CA 92069.*

OPS 60, *Shamrock Competition Imports Inc., P.O. Box 26247, New Orleans, LA 70186.*

K&B 61, *K&B Manufacturing Inc., 12152 Woodruff Ave., Downey, CA 90241.*

NAME THE PLANE CONTEST

Can you identify these pioneers?

If so, send your answer to: **Model Airplane News,** Name the Plane Contest (state issue in which photo appeared), 632 Danbury Rd., Wilton, CT 06897.

This month's "Name the Plane" is a bit different to correspond with our "Golden Age of R/C" series by Pappy deBolt. How many of these pioneers in the world of R/C can you identify? Start left to right, top row; then left to right, bottom row. You'll be amazed at some of the names.

Our mystery aircraft featured in the February '86 issue of *M.A.N.* was the Fairchild T-31 Trainer. Developed for the U.S. Navy in the 1940s, it was a fast trainer for the time, being capable of 170 mph-plus airspeed with a rate of climb in excess of 1,000 feet per minute. It had a wingspan of 41 feet, 4½ inches and a length of 27 feet, 10 inches, a controllable pitch prop, a bubble canopy, and retractable landing gear. Congratulations to Richard W. Gleason of Austin, Minnesota, for correctly identifying our mystery aircraft for February '86.

The winner will be drawn four weeks following publication from correct answers received by postcard delivered by U.S. Mail. If already a subscriber, the winner will receive a free one-year extension of his subscription.

Club of the Month

Canadian modelers have a lot to be proud of, not the least of which is the Oakville Model Flying Club of Oakville, Ontario. Located twenty miles west of Toronto, on the shores of Lake Ontario, the club has a current membership of 135, which includes 16 juniors, and a waiting list of prospective members. The club is fortunate enough to have two excellent flying fields. During the flying season, one of the fields is used almost exclusively for flight instruction and this past summer the club had over 30 registered students signed up.

Part of the club's efforts toward responsible operations is contained in a comprehensive "Flight Training Manual," which covers the club's history (which dates back to 1947); the Wings Program, which covers flight training and a ground school program; a code of conduct for all club members; and a map of the flying site and restricted areas. All clubs would benefit from such a manual; its scope is valuable and usable by any group of modelers.

The OMFC is a hotbed of activity in pattern and scale competition. Noted modeler and competitor Ivan Kristensen is a member of the club and tries to promote the club's involvement in pattern. Scale and Sport R/C are also of great interest to the members, as are helicopters, ducted-fans, and sailplanes.

Model Airplane News applauds the Oakville Model Flying Club and is pleased to award two free one-year subscriptions, which are to be given by them to their outstanding junior members.

Congratulations!

Each month M.A.N. will select the club newsletter that best shows the club's activities and energies directed toward the furtherance of the hobby. The award is not based on size or quality of the newsletter, and can be about any aspect of the hobby (F/F, C/L, R/C, boating, cars, etc.). M.A.N. will award two free one-year subscriptions to be given by the club to outstanding junior members. So send your newsletters to Model Airplane News, Club of the Month Contest, 632 Danbury Rd., Wilton, CT 06897.

Fox Eagle III, *Fox Manufacturing Co., 5305 Towson Ave., Fort Smith, AR 72901.*

Webra Blackhead, Picco 60, *Hobby Lobby International, 5614 Franklin Pike Circle, Brentwood, TN 37027. The Picco 60 is also available from Condor Trading Co. International, P.O. Box 3479, Mission Viejo, CA 92690.*

Tower Power Fuel, HP Gold Cup, *Tower Hobbies, P.O. Box 778, Champaign, IL 61820.*

Webra Speed, Webra Silverline, *Circus Hobbies, 3132 So. Highland Dr., Las Vegas, NV 89109.*

YS 60, *Golden Gate Hobbies, P.O. Box 123, San Bruno, CA 94066.*

Engine Mount, *Tatone Products Corp., 1209 Geneva Ave., San Francisco, CA 94112.*

Como 61, *World Engines Inc., 8960 Rossash Ave., Cincinnati, OH 45236.*

O.S. 61, ST 60, Irvine 61, ST S61, *Great Planes Model Distributors, P.O. Box 4021, Champaign, IL 61820.*

Rossi 60 ABC, *Sheldon's Hobby Shop, 3157 Alum Ave., San Jose, CA 95127.*

Fuel, *JMD Fuel Labs Inc., P.O. Box 235, North Olmsted, OH 44070.* ■

CLASSIFIED

RAZOR BLADES: single-edge industrial quality, super sharp. 100/$4.25, 200/$8.50, 300/$12.50, 500/$20.50, 1,000/$40.50; add 10% postage west of the Mississippi. Cobbie's Gifts, Box 2, Deal, NJ 07723; 201-922-9898.

1930-1950 model magazines for sale. Low price, $1.00 for list. Bruce Thompson, 328 St. Germain Ave., Toronto, Ontario, Canada M5M 1W3.

WANTED: RTF U-Control planes from Cox, Wen-Mac, Comet, Aurora, Testors, etc., complete or pieces, buy or trade. John Fietze, P.O. Box 593, Lynbrook, NY 11563.

SCALE MODELS BY WYLAM: Another classic by W.A. Wylam, this volume is a companion piece to the *Best of Wylam*. It covers the Consolidated A-11 through the Wright Whirlwind engine. Book is $5.00, plus $1.75 for UPS shipment. *M.A.N.*, 632 Danbury Rd., Wilton, CT 06897.

CAUDRON ¼-SCALE PLANS: rolled, postpaid, $22.50. SASE for info. Airmasters, 20026 Frazier, Rocky River, OH 44116.

ANTIQUE MODEL IGNITION ENGINES—PARTS CATALOG, 40 pages, precision cast timers, original cylinders, point sets, drive washers, tanks, for O&R, GHQ, Bantams, Mortons, O.K., others. Large catalog $2.00 pp. Chris Rossbach, RD 1, Queensboro Manor, Gloversville, NY 12078.

IMPORTED DIESELS: A-M, Aurora, D-C, E.D., M.V.V.S., K-Mills, Enya, P.A.W., Taplin, & ZOM. Standard & R/C. .036-.49. Aero & Marine. Sport, Vintage & Contest. Send $1.00 for catalog. Carlson Engine Imports, 814 E. Marconi, Phoenix, AZ 85022.

FLORIDA VACATION RENTAL: R/C World, Orlando, two or three bedroom fully-furnished condo available weekly or monthly. Pool, tennis, and R/C flying field. Call 305-281-8788 or write P.O. Box 560846, Orlando, FL 32856.

SUPER CYCLONE "CLASSIC" IGNITION ENGINES: .604 cu in. display box. Factory tested and ready to run (less batt., MT prop). Dual ign. $229.50, single ign. $199.50. Second head included FREE! For lit., send large SASE. Parts price list $1.50 pp. Super Cyclone Engines, Box 23690, Phoenix, AZ 85068; 602-870-3342.

SERVO SIMULATOR bypass circuit; runs your servo without R.C. Build for under $10. Send $1 pp. for schematic to J.A. Guerrero, 10940 Foothill Ave., Gilroy, CA 95020.

ANTIQUE MODEL PLASTIC, WOOD, METAL kits. Aircraft, Trains, Ships, Cars. Bought-Sold-Traded. List $1. A. Landau, P.O. Box 555 Rockville Centre, NY 11571.

LIQUIDATION OF IMPORTED MODEL AIRcraft accessories mostly carded. Retail value $37,000. Offers invited. Phone 619-691-0780.

FIREWORKS—Fun, Safe, Patriotic; top quality, lowest prices, illustrated catalog $1; (refundable), Pyro-Sonic Devices, Box 711MA6, Grand Haven, MI 49417.

HARDWARE AND SOCKET HEAD cap screws, all sizes, low prices. Write for complete list. Example 6-32x1" only $4.25 per hundred. Lane Distributing, P.O. Box 42A, Netcong, NJ 07857.

ON-BOARD GLOW IGNITION SYSTEM: Assembled with 4,000 mAh ni-cd, glowplug clip, adjustable micro-switch, etc. $10 U.S. postpaid; scale-like glow-plug connectors with 18-inch lead. $1.50 each plus 50 cents per order. D'Antoni RC, 32 Varbay PLNW, Calgary, Alberta T3A 0C8 Canada.

WANTED: *SCALE R/C MODELER* BACK ISSUES: Will pay premium or swap for the following back issues: Dec. 1975; June, Aug., Oct., Dec. 1978; Oct., Dec., 1979; Feb., Apr., June, Aug., Oct., Dec., 1980; Feb., June, Oct., Dec., 1981; Apr., June, 1982. Call collect (days only) 216-759-7007. Evenings 216-759-3363. Bob Jones, 4353 Sampson Rd., #4, Youngstown, OH 44505.

WANTED: Balsa fuselage Tiger Tail kit by Southern R/C Skysquire kit by Midwest. Fred Carnes, 28 Pebble Beach Dr., Shalimar, FL 32579; 904-651-0244.

GET LONGER FLIGHTS SAFELY: Monitor your in-flight fuel supply. LCD countdown timers. Beeps when counter reaches zero. Mounts easily to transmitter. Two button time set $14.95. Keyboard time set $19.95. Add $1.95 for postage and handling. Modelcraft, Box 435, Grayslake, IL 60030.

BRASS, ALUMINUM, AND COPPER. Tubing, strips, sheets, rods, and angles. Spring wire. Free brochure. Elwick, Dept. TMA5, 230 Woods La., Somerdale, NJ 08083.

WANTED: Kavan Electric starter. New or like-new condition. Ken Ramsburg, P.O. Box 266, Walkersville, MD 21793.

BEGINNERS: Discouraged by too-fast R/C "trainers"? Send $1 for three-page no-holds-barred commentary; 20 models rated for ease-of-flying. Jim Waterman, 3818 Deerfield, San Antonio, TX 78218.

LIGHTWEIGHT ALUMINUM NUTS AND SCREWS. Also large selection of stainless steel, nylon, titanium and colored aluminum fasteners. Catalog $1. Samples, sticker, catalog $5. List preferable sizes. Lightweight Fasteners, 10158 Stagg St., Sun Valley, CA 91352.

AVIATION MAGAZINES FOR SALE: 1950-1975, *Air Trails, Model Airplane News, Air Progress,* $1.50 each, postpaid. Send $1 for list. Alex Douglas, 986 Shaw St., Toronto, Ontario, Canada M6G 3M8.

CUSTOM EMBROIDERED EMBLEMS, CLOISONNE, ENAMELED PINS: Your design, low minimum, excellent quality, low prices. Free booklet. A.T. Patch Co., Dept. 135, Littleton, NH 03561; 603-444-3423.

NELITZ 1/3-SCALE J-3 KIT: Manufactured by R&M Quarter Scale Specialist. Complete kit includes tube steel, scale landing gear and cabane, machined metal fittings, and wood (plan set included also). A.W., 111 Honeysuckle La., Summerville, SC 29483; 803-873-5534.

WANTED: *Airpower* magazine Vol. 01, No. 01, or a Xerox copy. A. Dickau, 362 Merrow Rd., North Coventry, CT 06238; 203-429-3284 after 6 p.m. EST.

GOLDBERG ANNIVERSARY CUB constructed frame, $75. With new Futaba receiver, 4 servos, ni-cds installed, $235. Shipping charges collect. D. Smart, P.O. Box 2408, Slidell, LA 70459.

$10-$360 WEEKLY/UP, mailing circulars! No quotas. Sincerely interested, rush stamped envelope: National Mailing, Box 20728-MP4, San Diego, CA 92120.

R/C SCALE PLANS: Stearman PT17, Curtiss Goshawk, others. 1/6-scale $22.50, ¼-scale $35.50. Catalog $1. Richard Barron, 11506 Ohio Ave., Youngtown, AZ 85363.

Send ad and payment to: Classifieds, *Model Airplane News,* 632 Danbury Rd., Wilton, CT 06897.

Non-commercial classified ads (commercial ads of any kind not accepted at this special rate). Rate: 15 words or less, $4.50 payable in advance. No charge for name and address. Additional words, 25¢ each.

Commercial classified ads (rate applies to anyone selling on a commercial basis—retailers, manufacturers, etc.). Rate: 50¢ per word, payable in advance. Count all initials, numbers, name, address, city and state, zip and phone number.

Closing date for either type of ad is the 15th of the third preceding month (for example, January 15th for the April issue). We do not furnish box numbers. If you would like your ad to run in more than one issue, multiply amount of payment by number of months that ad is to run.

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